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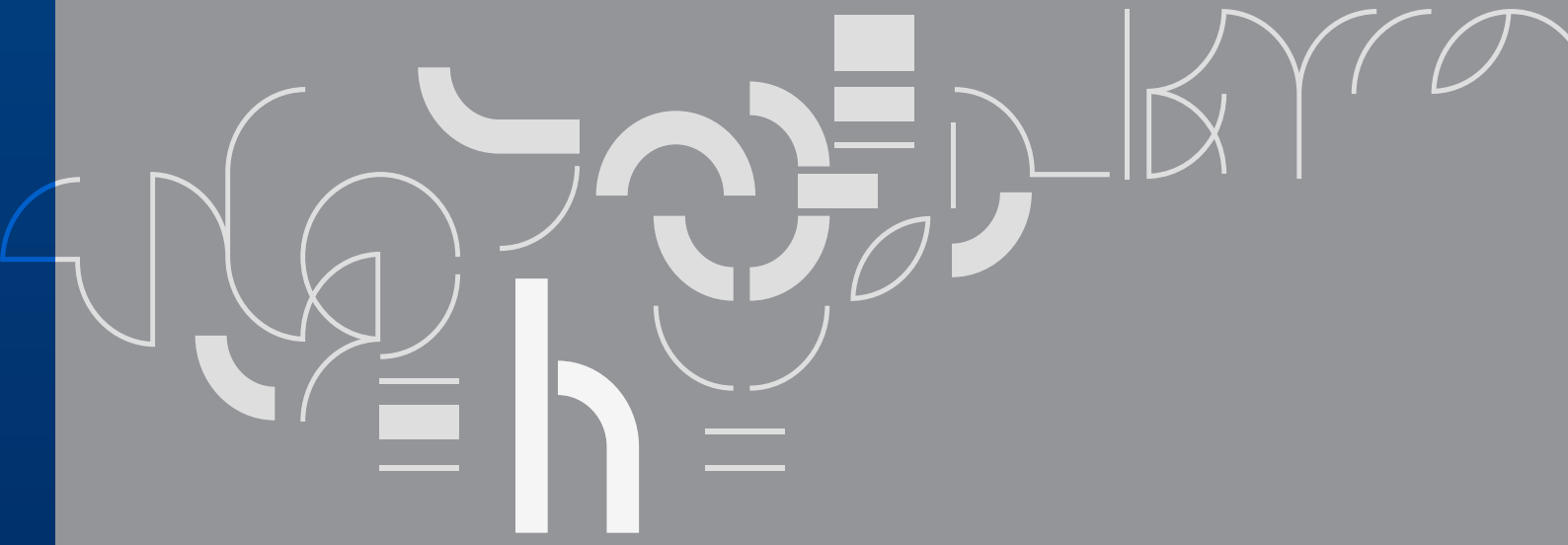

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Preface

The 12th Annual Meeting of the Gesellschaft für Semantik, better known as *Sinn und Bedeutung 12* or simply *SuB12*, was hosted by the Department of Literature, Area Studies and European Languages (ILOS) at the University of Oslo on September 20-22, 2007.

Our department, and especially the German section, has a long standing interest in semantics and pragmatics, which culminated with the organization of this important event. The initiative to take responsibility for *SuB12* came from Cathrine Fabricius-Hansen and Torgrim Solstad at *SuB10* in Berlin 2005. Fabricius-Hansen was chairwoman of *Sub12*, while her colleague Kjell Johan Sæbø handled most of the practical matters. Sæbø had a complete overview of the organization and at the same time no detail was too small for his attention.

141 abstracts were submitted to *SuB12*, 45 of which were accepted for presentation (in addition to 3 invited speakers and 10 alternates). The proceedings of *SuB12* contain 44 papers and run to a total of 677 pages.

We thank all the participants and especially our invited speakers Markus Egg, Groningen, Irene Heim, MIT, and Henriëtte de Swart, Utrecht, for contributing to the success of the conference.

I also thank Torstein Helleve from the Faculty of Humanities for technical assistance in editing the proceedings.

Oslo,
April 29, 2008.
Atle Grønn

Contents

A Semantic Analysis of Negative Islands with Manner Questions*

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Abstract

Dayal (1996) has proposed that a question presupposes that it has a most informative true answer. In this paper I argue that the reason for the unacceptability of negative manner questions is that this requirement can never be met in the case of these questions. This is because the domain of manners contains atoms that are not independent from each other: contraries. Therefore the truth of an (atomic) proposition in the Hamblin denotation of such questions has consequences for the truth of other atomic propositions. This state of affairs in the case of negative questions results in a situation in which it is not possible to select a maximal answer.

1 Introduction

This paper proposes an explanation for the oddness of negative islands with manner predicates such as (1). This example stands in contrast with the one in (2), which shows that a *wh*-word ranging over individuals can escape negation without any problem.

(1) *How didn't John behave at the party?

(2) Who didn't John invite to the party?

I will argue that the reason for the unacceptability of (1) is that it cannot have a maximally informative true answer. Dayal (1996) has argued that a question presupposes that there is a single most informative true proposition in the Karttunen denotation of the question, i.e. a proposition that entails all the other true answers to the

*I would like to thank especially Danny Fox for numerous discussions. I would also like to thank Gennaro Chierchia, Emmanuel Chemla, Jon Gajewski, Irene Heim, Roni Katzir, Giorgio Magri, David Pesetsky, Benjamin Spector and Anna Szabolcsi for comments, questions and suggestions.

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question. In this paper I show that in the case of negative manner questions, Dayal (1996)'s presupposition can never be met. The intuitive idea as for why these questions are bad is very simple: the domain of manners contains contrary predicates, such as *fast*, *slow*, *medium speed*, etc. However, as the domain of manners is structured in such a way that the predicates themselves are in opposition with each other, in the case of negative questions it will turn out to be impossible to select any proposition in the denotation of manner questions as the most informative true proposition.

An account for negative islands however not only has to apply for the odd examples above: it is also necessary to explain why in some cases the above examples can be rescued. There are two such cases in the literature. The first case is the important empirical observation made in Fox and Hackl (2005) (partly building on work by Kuno and Takami (1997)) according to which universal modals above negation, or equivalently, existential modals under negation save negative degree questions:

(3) How much radiation are we not allowed to expose our workers to?

(4) How much are you sure that this vessel won't weigh?

This pattern was noted for negative degree questions, but in fact it seems to be a general property of negative islands: (5) provides an example of a negative question about manners.

(5) How is John not allowed to behave at the party?

The second way to improve negative islands was discussed by Kroch (1989) who showed that examples like (1) become acceptable if the context specifies a list of options (cf. (6)).

(6) How didn't John behave at the party: wisely or impolitely?

This paper is organised as follows: Section 2 discusses certain key properties of manner predicates, while Section 3 introduces the proposal for the unacceptability of negative manner questions as well as the obviation facts shown above. In Section 4 I discuss some other instances of unacceptable negative questions such as questions involving temporal and spacial modifiers in certain environments, which I will show can receive a similar treatment to that of negative manner questions. Finally in Section 5 I compare the present account with previous proposals.

2 About manner predicates

2.1 Pluralities of manners

I will assume that manner predicates denote a function from events (e) to truth-values (t), or equivalently a set of events:

(7) [[fast]]={e | fast e}

Extending Landman (1989)'s version of Link (1983) to manner predicates, I will assume that we form plural manners as illustrated below:

(8) [[fast+carelessly]]= {{e | fast e} ,{e | careless e}}

Given this way of forming plural manner predicates, we arrive at a structured domain, not unlike that of the domain of individuals (cf. Link (1983) and subsequent work.). Let's pause for a second and think about how a plural manner such as the one in (8) will be able to combine with a predicate of events. Since in this case we have sets of sets of events, predicate modification will not be able to apply in a simple fashion. Furthermore, if we look at an example such as the one below, we also want our semantics to predict that the running event in question was both fast and careless.

(9) a. John ran fast and carelessly
b. λw. ∃e [run(w)(e)(John) ∧ fast+carelessly (w)(e)]

To resolve this type conflict and to derive the appropriate meaning, we will postulate an operator D that applies to plural manner predicates, much in the fashion of the distributive operator commonly assumed for individuals:

(10) $D(P_{PL})=\lambda e.\forall p \in P_{PL}\ p(e)$

Observe that talking about plural manners gives rise to all-or-nothing effects in the unmarked case.[1] However the formula in (11)c only means that there is no event of running by John that was both fast and careless.

(11) a. John didn't run fast and carelessly
b. 'John run neither fast nor carelessly'
c. λw. ¬ ∃e [run(w)(e)(John) ∧ fast+carelessly (w)(e)]

A similar effect has been famously observed in the case of predication over plural individuals (cf. e.g. Löbner (1985), Schwarzschild (1993), Beck (2001), Gajewski (2005)). The standard treatment of this effect is the postulation of a homogeneity presupposition on the distributive operator. Similarly, we will postulate a homogeneity presupposition on the D-operator introduced above:

[1]However, in some contexts it might be possible to understand such examples as if *and* was Boolean. To account for these cases we might say that *and* is in fact ambiguous between a Boolean and a plural-forming *and*. However, this will not change the reasoning because in the case of negative sentences the alternative that employs a Boolean *and* will not have a chance to be a maximally informative answer in any case. [thanks to Danny Fox (pc) for pointing this out to me.]

(12) D (P_{PL})=λe: [∀p∈ P_{PL} p(e)] or [∀p∈ P_{PL} ¬p(e)]. ∀p∈ P_{PL} p(e).

Let's look at an example of a positive question about manners. The Hamblin-denotation of the question will contain a set of propositions such as (13)b-c. Given our assumption that the domain of manners contains both singular and plural manner predicates, the question word *how* will range over both singular and plural manner predicates as well. Notice that I will assume that a question such as (13) talks about a contextually given event, which I will represent here by (e*). In other words the question in (13) is interpreted as 'How was John's running?'.

(13) a. How did John run?
b. λp. ∃q_{manner} [p=λw'. run (w')(e*)(John) ∧ q_{manner} (w')(e*)]
c. {that John ran fast, that John run fast+carelessly, etc..}

Given the D operator introduced above, the proposition that John run fast+carelessly will entail that John run fast and that John run carelessly. If this proposition is indeed the maximal true answer, we will conclude that John's running was performed in a fast and careless manner and in no other manner in particular.

2.2 Contraries and the ban on forming incoherent plural manners

The crucial assumption that I would like to introduce is that the domain of manners always contains contraries. The observation that predicates have contrary oppositions dates back to Aristotle's study of the square of opposition and the nature of logical relations. (cf. Horn (1989) for a historical survey and a comprehensive discussion of the distinction between contrary and contradictory oppositions, as well as Gajewski (2005) for a more recent discussion of the linguistic significance of contrariety). Contrariety is relation that holds between two statements that cannot be simultaneously true, though they may be simultaneously false. A special class of contraries are contradictories, which not only cannot be simultaneously true, but they cannot be simultaneously false either. Natural language negation is usually taken to yield contradictory statements (cf. e.g. Horn (1989)).

(14) Two statements are contraries if they cannot be simultaneously true

(15) Two statements are contradictories if they cannot be simultaneously true or false

A classic example of a pair of contrary statements is a universal statement and its inner negation (assuming that the universal quantifier comes with an existential presupposition) such as (16). Other examples of contrary statements include pairs of contrary predicates such as the sentences in (17) and (18):

(16) a. Every man is mortal
b. Every man is not mortal (=No man is mortal)

(17) a. John is short
b. John is tall

(18) a. John is wise
b. John is unwise

What distinguishes contrary predicates from contradictory predicates is that two contrary predicates may be simultaneously false: it is possible for an individual to be neither tall nor short, or neither wise nor unwise. This is also shown by the fact that the negation of predicates is usually not synonymous with their antonyms: the statement that *John is not sad* e.g. does not imply that he is happy.

Similarly to other predicates then, the domain of manners also contains contraries. In fact I will claim that every manner predicate has at least one contrary in the domain of manners (which is not a contradictory). Moreover, we will say that for any pair of a predicate P and a contrary of it, P', there is a middle-predicate P^M such that at least some of the events that are neither in P or P' are in P^M. (19) summarises these conditions on the domain of manners:

(19) Manners denote functions from events to truth values. The set of manners (D_M) in a context C is a subset of $[\{f \mid E \rightarrow \{1,0\}\} = \wp(E)]$ that satisfies the following conditions:
i. for each predicate of manners $P \in D_M$, there is at least one contrary predicate of manners $P' \in D_M$, such that P and P' do not overlap: $P \cap P' = \emptyset$.
ii. for each pair (P, P'), where P is a manner predicate and P'is a contrary of P, and $P \in D_M$ and $P' \in D_M$, there is a set of events $P^M \in D_M$, such that for every event *e* in $P^M \in D_M$ $[e \notin P \in D_M \ \& \ e \notin P' \in D_M]$.

I will assume that the context might implicitly restrict the domain of manners, just as the domain of individuals, but for any member in the set {P, P', P^M}, the other two members are alternatives to it in any context. Some examples of such triplets are shown below:

(20) a. P: wisely; fast; by bus
b. P': unwisely; slowly; by car
c. P^M: neither wisely nor unwisely; medium speed; neither by car or by bus

Given what we have said above it is somewhat surprising that the sentences below are odd: if the conjunction of two predicates is interpreted as forming a plural manner, and homogeneity applies, (21)a should mean that John ran neither fast nor slowly. Similarly, (21)b should simply mean that John's reply was neither wise nor unwise. We have just argued above that it is a property of contrary predicates that they might be simultaneously false. So why should the sentences in (21) be odd?

(21) a. #John did not run <u>fast and slowly</u>

b. #John did not reply wisely and unwisely

I will say that it is the presupposition on forming plural manner predicates $\{p_1,p_2\}$ that $p_1 \cap p_2 \neq 0$. It is then for this reason that the sentences in (21) are unacceptable: e.g. the plural manner {fast, slow} is a presupposition failure since it is not possible for a running event to be both fast and slow at the same time, and therefore the plural manner cannot be formed. This condition might be connected to a more general requirement that a plurality should be possible. Spector (2007) e.g. claims that plural indefinites induce a modal presupposition that requires that their plural reading be possible. Somewhat similarly, Szabolcsi and Haddican (2004) conclude that conjunctions, especially negated ones with homogeneity, have an "expected both" presupposition. It seems then that our presupposition that gives the restriction on forming incoherent plural manners might be part of a more general requirement on forming pluralities.

To sum up, in this section we have introduced a couple of assumptions about manner predicates that all seem to be motivated independently. Manner predicates have contraries, plus there is a predicate that denotes a set of events that belong to neither p nor its contrary. These three predicates are alternatives to each other in any context. The final assumption was that it is impossible to form incoherent plural predicates, which seemed to be again a general property of forming pluralities.

3 The proposal: Negative islands with manner questions

We finally have everything in place to spell out the account of negative manner questions. We will say that the reason for the ungrammaticality of questions like (1), in contrast to (2) is that there cannot be a maximally informative true answer to a negative question about manners. Why? The reason is rooted in the fact that the domain of manners contains contraries. Let's see how.

3.1 Positive and negative manner questions

Let's look first at positive questions about manners. As I have suggested above, in any given context, the domain of manners might be restricted, but for any predicate of events p, its contrary p' and the middle-predicate p^M will be among the alternatives in the Hamblin set. Suppose that the context restricts the domain of manners to the dimension of wisdom. Now the Hamblin-denotation of (22) will contain at least the propositions in (22)b:

(22) a: How did John behave?
b. {that John behaved wisely, that John behaved unwisely,
that John behaved neither wisely nor unwisely}

Suppose now that John indeed behaved wisely. Given that the three alternatives are exclusive (as contraries cannot be simultaneously true), if the Hamblin set contains only these three propositions, no other proposition will be true. In other words, the event in

question (e*) is an element of the set of events denoted by *wisely*, and not an element of any other set. This is graphically represented below:

(23) __e*____ _____ _____
wise med-wise unwise

Since in this case this is the only true proposition, this will at the same time be the most informative true answer as well. Note that if we had more propositions in the Hamblin set, e.g. *wisely*, *politely*, and their contraries respectively, as well as the plural manners that can be formed from these, the situation would be similar to questions that range over both singular and plural individuals. Suppose that John in fact behaved *wisely* and *politely*: given the distributive interpretation of plural predicates introduced above, this will entail that he behaved wisely and that he behaved politely, and imply that he did not behave in any other manner, i.e. he did not behave unwisely, impolitely, etc.

Let's look now at a negative question. First imagine, that our context restricts the domain to the dimension of wiseness.

(24) a: *How didn't John behave?
b. $\lambda p.\ \exists q_{manner}\ [p=\lambda w'.\text{behave}\ (w')(e^*)(\text{John}) \wedge \neg\ q_{manner}\ (w')(e^*)]$
c. {that John did not behave wisely, that John did not behave unwisely, that John did not behave neither wisely nor unwisely}

Suppose that *John did not behave wisely* was the most informative true answer. This would mean that the only set of events among our alternatives which does not contain the event in question (e*) is the set of wise events. But this means that the event in question is both a member of the set of events denoted by *unwisely*, and the set of events denoted by *neither wisely not unwisely (in short: med-wisely).* This situation is graphically represented below:

(25) a. John did not behave wisely
b. _____ ____e*____ ___e*_____
wisely med-wisely unwisely
→this cannot be true because of ((19) ii)

Yet, this cannot be true, because these two sets are exclusive by definition, and no event can be a member of both of them. Therefore (25) cannot be the most informative true answer to (24). What about an answer such as (26) below?

(26) a. #John did not behave wisely and unwisely
b. _____ ___e*_____ _____
wise med-wise unwise

This answer is ruled out by the presupposition that excludes the formation of incoherent plural manners. The predicates *wisely* and *unwisely* are contraries, and therefore they cannot form a plural manner. (As mentioned above, this is also the reason why the

sentence itself in (26) is odd.) Therefore the proposition that John did not behave wisely and unwisely is not in the set of alternatives. For this reason (26) cannot be the most informative true answer. But now we have run out of options, if neither (25) nor (26) can be a maximal answer, there is no maximal answer. It is easy to see that if we had more alternatives, e.g. the alternatives based on wiseness and politeness, (i.e. *wisely*, *med-wisely*, *unwisely*, *politely*, *impolitely*, *med-politely* and the acceptable pluralities that can be formed based on these) the situation would be similar: Any answer that contains only one member of each triplet leads to contradiction, and any answer that contains more than one member of each triplet is a presupposition failure. There is no way out, no maximal answer can be given. Notice also that in the case of questions about individuals a similar problem does not arise and therefore there is no obstacle for there being a maximal answer to these questions. For this reason, we predict the question in (2) to be acceptable.

It should be noted that given the similarity of selecting a maximal answer to definite descriptions, the above account predicts that definite descriptions such as (27) should be also unacceptable:

(27) #the way in which John didn't behave.

This prediction is indeed borne out. The reason is of course that there is no maximum among the various manners in which John did not behave.

3.2 Blindness

One might wonder why it is that the examples below do not make the negative manner questions grammatical[2]:

(28) A: *How didn't John behave?
B: Politely, e.g.
B' Not politely.

(29) *Bill was surprised how John didn't behave.

In other words, there are contexts by which a non-complete or mention-some answer can be forced, suggested or at least made possible. The marker *e.g.* explicitly signals that the answer is non-complete (cf. e.g. Beck and Rullmann (1999) on discussion), and as such the answer in (28)B should be contradiction-free. If so, we might expect that the existence of this answer should make the question itself grammatical. Negative term answers as (28)B' are usually also not interpreted as complete answers, as can be seen

[2](28)B was pointed out to me by Irene Heim and David Pesetsky (pc.), while (28)B' and (29) were brought to my attention by Emmanuel Chemla (pc.).

in exchanges such as *Who came*? *Not John.* [3] Finally, some verbs that embed questions with their weak meaning, such as *surprise* or *predict* might in fact be true under a "very weak" meaning*:* one might be surprised by who came, if one expected only a subset of the people among those who came to come. (cf. Lahiri (1991), Lahiri (2002)). In these cases too, we might expect the sentences to improve, contrary to fact.[4] Why is it that these instances of partial answers do not make negative manner questions good? In other words, since grammar also allows for weaker than strongly exhaustive readings, why can the hearer not recalibrate the condition on maximal answers into a weaker requirement, that of giving a partial answer?

I would like to argue that this apparent problem is in fact part of larger issue of the impenetrability of the linguistic system for non-linguistic reasoning, or reasoning based on common knowledge. As the requirement of the linguistic system is that there be a most informative true answer to the question, in the rare cases where this leads to a contradiction, we cannot access and recalibrate the rules for the felicity conditions on a question. Similar conclusions about the modularity of the various aspects of the linguistic systems were reached by Fox (2000) and Fox and Hackl (2005) about the nature of the Deductive System (DS) that he proposes, as well as in the above discussed Gajewski (2002). Similarly, Magri (2006) and subsequent work argues based on various examples that implicature computation should be blind to common knowledge. I contend then that the above observed impossibility of scaling down on our requirements based on contextual knowledge is part of a larger pattern of phenomena, where such adjustments to the core principles seem to be unavailable.

3.3 Ways to rescue Negative Islands

It was already mentioned briefly that explicit context restriction can rescue negative manner questions, as first observed by Kroch (1989). A second way to save negative island violations has been discovered by Fox and Hackl (2005) (partly based on Kuno and Takami (1997)): negative islands become perfectly acceptable if an existential modal appears under negation. This section shows that both of these facts are predicted by the present account in a straightforward manner.

3.3.1 Modals

Fox and Hackl (2005) (partly based on observations by Kuno and Takami (1997)) have noted that certain modals can save negative island violations: more precisely negative islands can be saved by inserting existential modals below negation or by inserting universal modals above negation:

[3] Although von Stechow and Zimmermann (1984) report somewhat different judgements from mine and Spector (2003). On the other hand, if a negative term answer were to be interpreted exhaustively, then if we only have three alternatives: {*politely*, *impolitely*, *mid-politely*} we should infer from the answer in (28)B' that John behaved politely, and in no other way, which is not a contradiction in itself.

[4] The examples with *predict* seem better, however on should be cautious: Given that *predict* selects for future tense, these examples are in fact parallel to the cases with modals, discussed in the next section. Their acceptability therefore should get the same explanation as that of the modals.

(30) How is John not allowed to behave?

(31) How did John certainly not behave?

The reason why these are predicted to be good in our system is that the contrary alternatives that are required to be true by exhaustive interpretation of the complete answer can be distributed over different possible worlds, hence the contradiction can be avoided: Notice that unlike before, we are not talking about a specific event any more, but the event is existentially quantified over. The existential quantification is presumably provided by the existential modal.

(32) $[[\text{How is John not allowed to behave?}]]^w$
$=\lambda p.\ \exists q_{manner}\ [p=\lambda w'.\neg\exists w''_{Acc(w',w'')}.\exists e[\text{behave}(w'')(e)(\text{John}) \wedge q_{manner}\ (w'')(e)]]$

Imagine again a scenario, in which we have restricted the domain to the dimension of politeness. As before, the set of alternatives will at least include three contrary predicates: *politely*, *impolitely* and *neither politely nor impolitely* (represented below as med-politely)

(33) a. John is not allowed to behave impolitely.
b. $\underset{\text{politely}}{\_\_\Diamond\exists e\_\_\_\_}$ $\underset{\text{med-politely}}{\_\_\_\_\Diamond\exists e\_\_\_\_}$ $\underset{\text{impolitely}}{\_\_\_\_\neg\Diamond\exists e\_\_\_}$

There is no obstacle in this case for choosing a most informative answer, e.g. (33) above. This is because it might be the case that *impolitely* is indeed the only manner in which John is not allowed to behave, and in every other manners he is allowed to behave. In other words, it is allowed that there be an event of John behaving in a polite manner, and that there be another event of John behaving in a med-polite manner. The contradiction is resolved by distributing predicates over different worlds and events. Since universal modals above negation are equivalent to existential modals below negation, the same reasoning holds for (31) as well. On the other hand we predict manner questions where universal modals can be found under negation to be unacceptable. This is because in this case, instead of distributing the mutually exclusive propositions over different worlds, we require them to be true in every possible world, which of course is impossible. (Notice that assuming as before that the universal modal quantifies over worlds and events, the event variable is now universally quantified over.)

(34) *How is John not required to behave?

(35) $[[\text{How is John not required to behave?}]]^w$
$=\lambda p.\exists q_{manner}\ [p=\lambda w'.\neg\forall w''_{Acc(w',w'')}\ \forall e\ [\text{behave}\ (w'')(e)(\text{John}) \wedge q_{manner}\ (w'')(e)]]$

Why is the sentence in (36) below unacceptable as a maximal answer?

(36) a. #John is not required to behave impolitely.
b. __□∀e____ ____□∀e____ ____¬□∀e___
politely med-politely impolitely

The problem is that if *impolitely* is the unique manner such that John is not required to behave that way, then for the other two alternatives it must be the case that John is required to behave in that manner: However, this is again a contradiction as these manner predicates are exclusive. Furthermore, just as we have seen before in the case of non-modal negative manners, it is not possible to form incoherent plural manners, therefore an answer such as #*John is not required to behave politely and impolitely* will not be possible either.

3.3.2 Explicit domains

If we restrict the set of possible answers in appropriate ways, we might get rid of the contradictions that cause problems. An example of this effect might be if we simply list the potential alternatives. The relevant observation goes back to Kroch (1989):

(37) How did you not behave: A-nicely, B-politely, C-kindly?

In this case the set of alternatives is restricted to the non-plural manners A,B,C, (and potentially the sets that can be formed of these, depending on the rules of the multiple choice test). As this set does not have to contain any contraries, the difficulties that lead to weak island violation does not arise here, and hence the sentence is predicted to be good. In fact we also predict that if the list contained three predicates of manners that are mutually contraries to each other, the question should still be bad. I think that this prediction is indeed borne out:

(38) *How do you not speak French? A: very well B: so-so C: badly

The problem is that on the one hand a complete answer such as I do not speak French [α+β] violates the presupposition against forming incoherent manner predicates, but the complete answer I speak French α leads to a contradiction.

4 Negative island-like phenomena based on the same logic

As the examples below show, we observe marked ungrammaticality with final punctual eventive verbs (e.g. *die*), but not with statives (e.g. *be happy*).

(39) *When did Mary not die?

(40) When didn't you feel happy?

It also seems that there is a scale of acceptability judgements in between these two extremes. These facts can be explained by the same logic as we have seen above: given

that dying is a point-like event, there are infinite points in time (or intervals) such that it is true that Mary did not die at these times. However, these propositions are not ordered by entailment and therefore there is no maximally informative alternative among these true propositions. With statives on the other hand, it is possible to construct a scenario such that there is one maximal interval at which you did not feel happy.

A very similar pattern can be seen with questions formed by *where*. The example in (41) is deviant because it is not possible given the normal laws of our world to be at more than one place at the same time: yet this is exactly what a maximal answer to this question would require.

(41) *Where aren't you at the moment?

(42) Where hasn't Bill looked for the keys?

5 Summary and comparison with previous accounts

The most influential approach to negative islands has been the family of syntactic accounts. Rizzi (1990) (partly building on Obenauer (1984)) proposed that movement can be blocked by items that are sufficiently similar to the moved item. This is in fact the central idea of 'Relativised Minimality'. In the case of negative islands this idea is manifested by the fact that negative elements are A-bar specifiers, and therefore they are interveners for the movement of the like A-bar *wh*-phrases. (cf. also Cinque (1990), Comorovski (1989), Kroch (1989) for refinements, as well as its various later implementations in Chomsky (1995), Manzini (1998), Starke (2001) among others). However, in connection with negative islands it has been pointed out in the literature that while negation can be cross-linguistically expressed as a head or a specifier or an adjunct, yet the island-creating behavior of negation does not vary cross-linguistically. (cf. Szabolcsi (2006)) Second, it was also pointed out that while the theory claims to be syntactic, yet the characterization of the good vs. bad extractees seems to be semantic in nature (cf. Szabolcsi and Zwarts (1993), Honcoop (1998), Rullmann (1995)). To these well-known complaints we might add the problem of modal obviation discussed above. It is highly unlikely that a syntactic account could be extended to explain these facts: if negation is an A-bar intervener, the addition of a modal should not be able to change this fact.

The most important semantic alternative to these syntactic accounts has been proposed in Szabolcsi and Zwarts (1993). They attempt at drawing a principled demarcation line between the scopal expressions that create intervention, and those that do not. According to their theory, each scopal element is associated with certain Boolean operations. This claim should be understood that each scopal element in conjunction with a distributive verbal predicate can be interpreted as a Boolean combination of singular predications. Negation corresponds to taking Boolean complement. For a *wh*-phrase to take scope over a scopal element means that the operations associated with the scopal element need to be performed in the *wh*-phrase's denotation domain. However, if

the *wh*-phrase denotes in a domain for which the requisite operation is not defined, it cannot scope over a scopal element. E.g. a question such as *Who does John like?* has part of its denotation {a: <j,a> ∈ [[love]]}. As this is a set of individuals, it has a complement, and therefore the negative question is grammatical. In other words, in this theory sets of individuals serve as denotations for predicates, if the argument slot abstracted over is filled by an atomic individual. Manner predicates however are argued to be collective and therefore they do not have a component {α: j behaved in α}. Instead, they have what one might write as ια [j behaved in α], and the question asks which (collective) manner is identical to this unique individual (sum). That is why manner questions are bad: one cannot complement an i-sum. Thus Szabolcsi and Zwarts (1993)'s proposal is based on the interesting idea that the difference between the good and the bad extractees is to be found in their domain. This idea is shared by the present proposal a well, albeit in a rather different form. However, Szabolcsi and Zwarts (1993) do not offer very strong arguments as for why manners have to be collective. Further, similarly to the syntactic accounts, Szabolcsi and Zwarts (1993)'s theory does not explain the modal obviation effects discovered by Fox and Hackl (2005)[5].

In this paper I have argued that the felicity condition on asking a question according to which the speaker should be able to assume that the hearer might be able to know the most informative answer can never be met in the case of negative manner questions. This was because the domain of manners contained atoms that were not independent form each other: contraries. Therefore a truth of an (atomic) proposition in the Hamblin denotation of such questions had consequences for the truth of other atomic propositions. This state of affairs in the case of negative questions resulted in a situation in which it was not possible to select a maximal answer. The reasoning proposed in this paper is similar in spirit to the one employed in Fox and Hackl (2005) for negative degree questions: they also argue that the maximality condition that Dayal (1996) proposes is never met in the case of negative degree questions. Extending the account offered in Fox and Hackl (2005), Fox (2007) proposes that the following generalisation holds for sets of propositions that cannot have a maximal element:

(43) Fox (2007)'s generalisation
Let p be a proposition and A a set of propositions. p is *non-exhaustifiable given A:* [NE (p)(A)] if the denial of all alternatives in A that are not entailed by p is inconsistent with p.
(i) $[NE(p)(A)] \Leftrightarrow p\& \cap\{\neg q: q \in A \ \& \neg(p \Rightarrow q)\} = \varnothing$.
$\Leftrightarrow \forall w MAx_{inf}(A)(w) \neq p$

He proves that obviation by a universal, but not by existential quantification is a trivial logical property of such sets: The generalisation about the NE sets of propositions subsumes the cases of manner islands discussed here. Thus the observed pattern of modal obviation has a principled explanation in our system based on Fox (2007).

[5]Though Anna Szabolcsi (pc.) suggests that an account similar to the one given in this paper, based on multiple events, could be adopted to their account as well.

However, one question one might ask, whether there is a more restrictive generalisation than that offered by Fox (2007). Abrusan (2007) argues that indeed a more restrictive generalisation, stated below, can subsume both the cases of negative manner and degree islands.

(44) Let p be a proposition and A a set of propositions. For any p, there are at least 2 alternatives in A such that each of them can be denied consistently with p, but the denial of both of these alternatives is inconsistent with p.

Let's observe how the above generalisation is manifested in the proposal of negative manner questions argued for in this paper. Recall the basic case of a negative manner question. Let's assume for the sake of simplicity that that the context restricts the domain to the dimension of politeness:

(45) a. *How didn't John behave?
b. $\lambda p.\ \exists q_{manner}\ [p=\lambda w'.\ behave\ (w')(e^*)(John) \wedge \neg\ q_{manner}\ (w')(e^*)]$
c. {that John did not behave wisely, that John did not behave unwisely, that John did not behave neither wisely nor unwisely}

We can see that each alternative to any proposition p in the Hamblin denotation can be denied consistently with p. However the denial of any two alternatives at the same time leads to a contradiction.

Finally, let me address the question as to why the contradiction that we derive in the case of negative manner questions leads to ungrammaticality, as opposed to simple semantic oddness. Gajewski (2002) has proposed that we need to distinguish between analyticity that results from the logical constants alone, from analyticity that is the result of the non-logical vocabulary. He argues that sentences that express a contradiction or tautology solely by virtue of their logical constants (L-analytical sentences, in his terminology) are ungrammatical. A complete answer (i.e. the maximal answer q together with the negation of every alternative in the question's denotation not entailed by q) to negative manner questions is always L-analytical. This is because for any predicate of manners p, the set of alternatives will always contain its contrary manner p' as well as a third manner predicate p^M that expresses that the event was neither p nor p'. This will have the consequence that the set of propositions that the complete answer to a negative manner question requires to be true is always incoherent. Thus complete answers to a negative manner question are L-analytic, and hence, predicted to be ungrammatical by Gajewski (2002)'s condition.

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On the Role of Past Tense in Resolving Similarity in Counterfactuals*

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Abstract

In this paper I investigate the semantics of counterfactual conditionals. I propose a generalized *de re* analysis according to which counterfactuals are predicated *de re* of situations in the actual world. I compare the resulting *local* view of similarity with the *global* view found in Lewis-Stalnaker style proposals, presenting arguments in favor of the former. In the *de re* analysis, past tense identifies the actual world situation the counterfactual is about.

1 Introduction

In their classic analysis of the interpretation of counterfactuals, both Stalnaker (1968) and Lewis (1973) assigned a crucial role to the notion of *similarity*. My objective in this paper is to examine similarity in counterfactuals, and tie it to the semantics of past tense: I will provide arguments in favor of a *local* view of similarity (as opposed to the *global* perspective taken by Stalnaker and Lewis) and I will spell out a semantics of tense in the situations framework of Kratzer (1989), blurring the boundaries between times and worlds.

I will begin by briefly presenting similarity in a Lewis-Stalnaker style analysis of counterfactuals. Setting aside some differences, a Lewis-Stalnaker style analysis can be characterized (roughly) as follows:

*I would like to thank Angelika Kratzer and Phil Bricker for early discussions related to this material. All mistakes are my own.

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(1) α *would* β is true in (a world) w_0
iff the α-worlds most similar to w_0 are also β-worlds
iff $\{w: S(w_0)(\alpha)(w)\} \subseteq \{w: \beta(w)\}$

In the proposal above, S stands for a contextually supplied similarity relation. It takes as input a world and a proposition, and delivers as output the most similar worlds to the input world in which the proposition is true (allowing for ties in similarity, and making the limit assumption). Standardly, the input world is the actual world, and the proposition is the proposition corresponding to the antecedent of the counterfactual.

The relation of similarity S is such that it can take into account both the laws of the input world, as well as the facts of the input world (all features of the world count). The weighing of laws and facts is a notoriously difficult topic, but in principle S is context dependent, and relative weight can vary from context to context. The relation S can be thought of as a relation of *global* similarity (*g-similarity*): though some features matter more than others, all features are relevant.

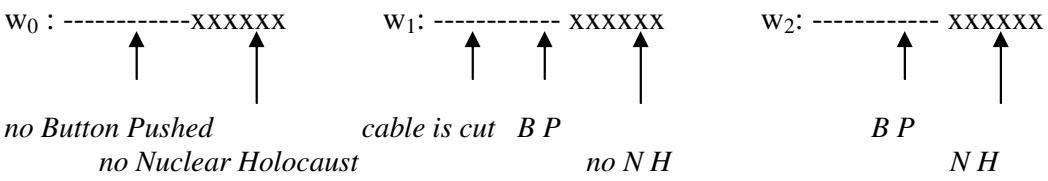
Fine (1975) raised some concerns regarding the role of similarity in identifying the quantificational domain of counterfactuals, and Lewis (1979) responded by spelling out a detailed picture of how it must work. According to Lewis, there are fixed constraints on the weighing of S. The restrictions are such that exact match with respect to facts matters more than match with respect to the laws, and mere approximation to the facts without match does not really make any difference. The result is a sophisticated view of g-similarity. When evaluating a counterfactual in the actual world, sophisticated g-similarity will ensure that the worlds quantified over match the actual world before the antecedent event and that they obey the laws afterwards. These are the worlds that will count as 'most similar'.

As Lewis (1979) shows, sophisticated g-similarity can account for the examples presented by Fine (1975):

(2) If Nixon had pushed the button, there would have been a nuclear holocaust.
Fine (1975)

Sophisticated g-similarity ensures that the worlds quantified over in counterfactuals are worlds that are like the actual world (w_0) before the button is pushed, and obey the laws of the actual world afterwards. These will be worlds like w_2, in which the button is pushed, and there is a nuclear holocaust afterwards.

(3)



Worlds in which somebody cut the cable before the button was pushed (like w_1), which differ from the actual world at some time before the button pushing event, will not enter the domain of quantification of the counterfactual. The fact that in those worlds there is button pushing without a holocaust will not affect the truth conditions of the sentence.

2 A generalized *de re* analysis

In this paper I would like to compare the global account of similarity that is part of the Lewis-Stalnaker semantics with a 'local' approach. Instead of a view according to which all facts matter in figuring out the domain of quantification of counterfactuals, I will present a view according to which only certain facts matter. In the analysis presented here, counterfactuals are interpreted as making *de re* claims about past facts. The proposal divides the work traditionally carried out by the g-similarity relation into two parts: the role of identifying the actual-world facts that matter (the *res* the counterfactual is about) is assigned to past tense, and the role of invoking the laws relevant to the resolution of the counterfactual is assigned to the modal. Some intuitive motivation for the idea that counterfactuals are about 'some facts' (as opposed to all the facts) can be found in Adams's famous examples (Adams 1970):

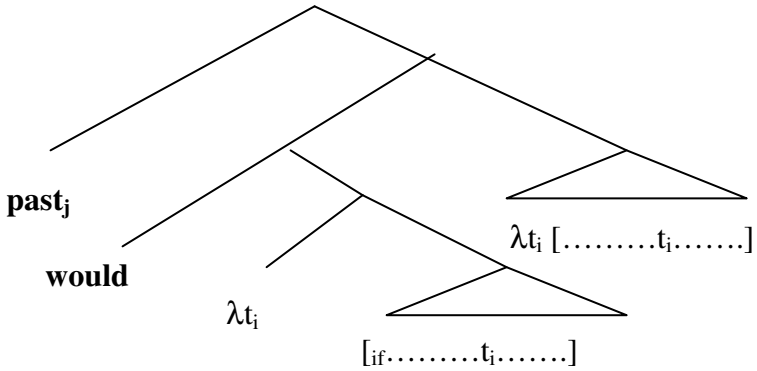
(4) a. If Oswald didn't kill Kennedy, somebody else did.
b. If Oswald hadn't killed Kennedy, somebody else would have.

As Adams pointed out, our intuitions regarding (4a, b) differ. We tend to judge (4a) true and (4b) false. One way of understanding this would be to say that in the case of (4a), we are obliged to consider worlds that are like the actual world with respect to the facts regarding Kennedy's death. In the case of (4b), however, we can set some facts aside. In particular, we are allowed to consider worlds in which Kennedy was not killed at all. It is the possibility of considering the truth of the antecedent in worlds that fail to match the actual world regarding Kennedy's death that explains our intuitions about (4b). In this sense, (4b) shows a *reduced dependency* on facts. This fits in well with the idea that (4b) is only about *some* facts.

2.1 Preliminaries

I will adopt the simplified structure in (5) (but see von Fintel (2001), Bhatt et al. (2001):

(5)



One of the puzzles that needs to be addressed when dealing with tense in counterfactuals is the interpretation of the apparently past-tense morphology in the antecedent clause. According to (5), there is a past tense in counterfactuals, but it surfaces above the modal, c-commanding both the antecedent and consequent clause of the conditional (the relation between the interpretation of *would*-conditionals and past tense had already been investigated by Thomason and Gupta (1980), and has been the subject of much recent interest, see a.o. Iatridou (2000), Ogihara (2000), Ippolito (2003)).

It has been observed that even though tense *morphology* in the antecedent clause of counterfactuals surfaces as past, the *reference time* for the antecedent clause can be past, present or future (an early version of this observation can be found in Dudman (1984)). In the proposal made here, the reference time of the antecedent clause is set by the modal (Section 2.3): it combines with a property of times and fixes its reference time (the idea that modals are responsible for shifting reference times can be found in various places in the literature, a.o. Abusch (1996), Condoravdi (2001), Enç (1996)). According to (5), the antecedent clause denotes a property of times. This proposal allows us to make sense of the presence of past morphology in the antecedent and the absence of a past interpretation. Tense in the antecedent clause is a variable tense, that surfaces with the morphological features of the c-commanding past tense (for a theory of agreement of tense features, see Kratzer 1998). As a variable, tense in the antecedent clause can give rise to a bound reading, resulting in the property of times manipulated by the modal.

2.2 Interpreting past tense

My objective in this paper is to defend a view of counterfactuals according to which the presence of past tense is linked to the counterfactual interpretation. Part of the analysis is the idea that the information encoded in past tense is not purely temporal. As we will see, past tense in counterfactuals brings with it the features relevant for evaluating similarity. In this account, there is a modal dimension to tense, and the analysis encodes it by allowing tenses to refer to situations (understood as in Kratzer 1989), thus bringing together information about worlds and times.

In a Kratzer-style framework, situations are part of worlds (where worlds are considered maximal situations). Given a Lewis-style perspective, situations are considered to be at most part of one world. To distinguish this mereological part-of relation from the modal part-of relation I will also make use of, I will use $part_k$ ($<_k$).

In a referential theory of tense, tenses are characterized as pronouns (a.o. Partee 1973, Heim 1994, Kratzer 1998). Working with a situations framework, I propose the denotation below:

(7) **A 'pronoun' theory of tense**
$[[\textbf{past}_i]]^g = g(i) = s_i$, where s_i is presupposed to precede the speech event.

As well as the mereological part-of relation ($<_k$), I will make use of a modal part-of relation ($<$). Following Lewis, situations (as individuals) are identified in other worlds via *counterparts*. I will say that a situation in the actual world is *part of* another world (not in a strict k-sense) to claim that the actual world situation has a counterpart in another world. Imagine that s is a situation in the actual world, and s' is a situation in another world, then:

(8) $s < s'$ *iff* s has a counterpart in s'

As usual, counterpart relations are contextually established on the basis of salient parameters of similarity.

I have referred to the view presented here as a *de re* analysis of counterfactuals. In Section 2.3 I propose a denotation for *would* in which the modal is given an argument slot for the situation identified as the denotation of past tense (see (5)). The counterfactual construction functions as a modal predicate of this situation. Thus the counterfactual is predicated *de re* of this situation.

2.3 A law-like modal

Let us consider the denotation of *would*. For the sake of clarity, I will begin by finding an abbreviation for the future-shifted proposition identified by the modal on the basis of the antecedent clause. Suppose that p is the property of situations corresponding to the denotation of the antecedent clause, then:

(9) $p^* = \lambda s\ \exists s'$: $s' < s$ & s' is non-past & $p(s') = 1$

I will treat modals as restricted quantifiers over possible worlds. In the spirit of von Fintel (1994), I will assume that the modal in counterfactuals enters the derivation with a variable that restricts its domain of quantification. In the case of counterfactuals, the domain of quantification is restricted to law-like worlds:

(10) Given two propositions p* and q*, and a past situation s in w,
$[[\textbf{would}_{\textbf{L}}]]^{w, g}(p^*)(q^*)(s) = 1$ iff
$\{s_L': s<s_L' \ \& \ p^*(s_L') = 1\} \subseteq \{s_L: \exists s_L'': s_L<s_L'' \ \& \ q^*(s_L'') = 1\}$,
where s_L is a situation that satisfies the set of laws L salient in the context.

The contribution of the resource variable L introduced by *would* could be unpacked as follows:

(11) Given a situation s,
$\{s_L': s<s_L' \ \& \ p^*(s_L') = 1\}$ *abbreviates* $\{s': s<s' \ \& \ [[\textbf{L}]]^{w\ g}(s') = 1 \ \& \ p^*(s') = 1\}$
where g(**L**) is the set of possible situations characterized by the contextually salient/ relevant laws of w

According to (10), *would* combines with two propositions and a situation. Given (5), this will be the situation corresponding to the denotation of *past* in the counterfactual (the *res* situation). We will obtain truth iff all the law-like situations that extend the *res* situation in which the antecedent proposition is true are also situations that can be extended to lawlike situations in which the consequent proposition is true. The only facts about the actual world that matter for the identification of the domain of quantification are the features corresponding to the denotation of *past* (the *res* situation). We are making use of similarity relations, but only *locally*, with respect to the *res* situation (only the features corresponding to this situation count). (Note that proposals to quantify over situations and put constraints on their extensions can be found in the literature, for example in Heim (1990)'s anlysis of E-type pronouns).

In the proposal in (10), *would* appeals to the laws of the evaluation world. The concept of law should be understood broadly, to include natural laws, regularities and expectations. I will not be able to discuss in greater length the types of laws invoked by *would*. However, it is worthwhile pointing out that the modal will activate a subset of the laws, and not all generalizations need to be taken into consideration simultaneously. An antecedent proposition that violates some laws will not lead to inconsistencies.

Before working through an example, let us consider an alternative to (10) in terms of possible worlds:

(12) *A worldly alternative*
Given two propositions p* and q*, and a past situation s in w,
$[[\textbf{would}_{\textbf{L}}]]^{w, g}(p^*)(q^*)(s) = 1$ iff
$\{w_L: s<w_L \ \& \ p^*(w_L) = 1\} \subseteq \{w_L: q^*(w_L) = 1\}$

The accounts in (10) and (12) are very similar. The only difference is that in (12) we are quantifying over possible worlds, whereas in (10) we are quantifying over possible worlds and the situations that constitute them (remember that possible worlds are a type of situation). The difference can thus be thought of as a difference of 'granularity': in

(12) we care only about the maximal situations that contain s, and in (10) we care about all the situations that contain s. We will see in Section 4 why the difference matters.

To illustrate (10), let us work through an example:

(13) *An example*
[[**If Sara had visited my house, she would have sneezed**]]$^{w\,g}$ = 1 iff
{s_L': s<s_L' Sara has visited my house in s_L} ⊆
{s_L: ∃s_L": s_L<s_L" & Sara has sneezed in s_L"}

Imagine that Sara is a friend of mine allergic to cats, and that I have two cats at home. Suppose past tense denotes a situation s corresponding to these features of the actual world and L invokes the actual world laws that make people with allergies to cats sneeze in the presence of cats. With this set up, (10) predicts the counterfactual will be true. All law-like situations that include (a counterpart of) s in which Sara has visited my house will also be situations that can be extended to law-like situations in which Sara sneezed. The role of past tense is to identify the (accidental) features of the actual world that matter for the interpretation of the counterfactual. The rest is up to the laws.

The proposal in (10) makes use of the possibility of allowing *past* to have as denotation the situation corresponding to the actual world features of me having cats, my friend having allergies, etc. However, given that *past* is a variable, its denotation depends on the variable assignment. What happens if *past* is assigned as value an 'irrelevant' situation? For example, the situation s of me having brown hair? Such an assignment would make (13) false. In itself, this is not wrong. However, variable assignments encode shared knowledge and mutual understanding about communicative intentions: listeners will try to accommodate values that allow (13) to be true.

As a last remark, let me note that the proposal in (10) quantifies over law-like worlds that include (a counterpart of) the *res* situation. The proposal does not make any claims about how exactly the *res* situation fits into the situations quantified over (except to claim that they are law-like). This seems advantageous over global views of similarity, that must deal with the difficult problem of explaining when and how divergence takes place from the actual world history.

2.4 Weakly-centered similarity

One of the differences between the *de re* analysis presented here and a Lewis-Stalnaker style account has to do with the centering of similarity. Lewis (1973) discussed two possible ways of conceptualizing similarity: it could be strongly centered or weakly centered. The features of the similarity relation in each case are presented below:

(14) *Strongly centered similarity*
• No world is more similar to *i* than it itself is.

- A world *i* is more similar to itself than any other world is.

(15) *Weakly centered similarity*
- No world is more similar to *i* than it itself is.
- There may be worlds other than *i* that are as similar to *i* as it itself is.
(Lewis 1973: 29)

To see the different options at work, consider the example in (16):

(16) If Verdi had been Italian, Bizet would have been French.

Given a strongly centered similarity relation, (16) will be judged true. This is because if similarity is strongly centered, counterfactuals with true antecedents and true consequents come out true. With a weakly centered similarity relation (16) could be judged false. With weakly centered similarity, there could be worlds other than the actual world just as similar to the actual world. And it could be the case that Verdi was Italian in such worlds and Bizet was not French. With weakly centered similarity, the mere truth of the antecedent and of the consequent (in absence of a law-like regularity) does not guarantee the truth of the counterfactual.

The *de re* analysis presented above patterns with weakly centered similarity. There is no actual world fact that guarantees, in conjunction with the laws, that a world in which Verdi is Italian will also be a world in which Bizet is French. Intuitively, this is the case because no feature of the actual world 'connects' those two truths. The result is that (16) would come out false, and that, in general, counterfactuals with true antecedents and consequents can be false.

Lewis favored strongly centered similarity, but noted that the oddness of examples like (16) gets in the way of our judgments: *In fact, the oddity dazzles us. It blinds us to the truth value of the sentences, and we can make no confident judgment one way or the other. We ordinarily take no interest in the truth value of extreme oddities, so we cannot be expected to be good at judging them. They prove nothing at all about truth conditions*. (Lewis 1973: 28)

3 On *aboutness* in counterfactuals

The *de re* analysis makes use of a referential theory of tense and claims that past tense is responsible for picking out the actual world features counterfactuals are about. In this section I will provide some intuitive support for this view, by pointing out that we do indeed have intuitions regarding the situations counterfactuals are about. In the examples, we will embed counterfactuals in belief contexts, and make use of the account of belief-sentences proposed in Kratzer (2002).

According to Kratzer (2002), knowledge can be characterized as true belief about facts. The proposal is in (17), with auxiliary definitions for *fact* and *minimal situation* in (18):

(17) S *knows* p iff
(i) There is a fact *f* that exemplifies *p*
(ii) S believes *p de re* of *f*, and
(iii) S can rule out relevant possible alternatives of *f* that do not exemplify *p*.
(Kratzer 2002)

(18) If s is a possible situation and p is a proposition, then s is a *fact* exemplifying p iff for all s' such that s'<s and p is not true in s', there is an s" such that s'<s"<s and s" is a minimal situation in which p is true. (A minimal situation in which p is true is a situation that has no proper parts in which p is true) (Kratzer 2002)

The proposal in (17) allows Kratzer to deal with the well-know problems posed by *Gettier-examples* and still hold on to a characterization of knowledge as justified true belief:

(19) A Gettier example:
Smith knows that either Jones owns a Ford or Brown is in Barcelona.

We should imagine (19) uttered in a context in which Jones used to own a Ford and has just offered Smith a ride in a Ford. Smith has strong evidence that Jones owns a Ford, and given his belief that Jones owns a Ford, Smith is willing to believe that either Jones owns a Ford or Brown is in Barcelona (though Smith has no evidence about Brown's whereabouts!). It turns out that Jones has sold his Ford, and is driving around in a friend's car, and Brown actually is in Barcelona. Smith believes a true proposition, however in this context we judge (19) false. Kratzer's proposal correctly predicts this: Smith is not properly acquainted with the facts (a kind of situation) that make the embedded proposition true.

Having a theory that ties knowledge of a proposition to an appropriate acquaintance with the situation that makes it true, let us turn now to counterfactuals. The proposal in (10) claims that counterfactuals are about the situation corresponding to *past*. We can use our intuitions regarding counterfactuals embedded under belief in Gettier contexts to identify the situation counterfactuals are about (the situation that makes the counterfactual true). Consider (20):

(20) Smith knows that if Nixon had pushed the button, there would have been a nuclear holocaust.

Imagine the sentence uttered in the following context: at some point in the past, the button had been connected to an A-set of missiles, and if those had been launched, there would have been a nuclear holocaust. Smith knew this. But at some later point, there was a change of strategy, and the button was disconnected from the A-missiles and

connected to a B-set of missiles. If those had been launched, there would have been a nuclear holocaust. Smith never found out that the wiring had been changed. In this scenario we would say that the sentence in (20) is false. Following Kratzer's account, we could explain this by saying that Smith was not properly acquainted with the situation that makes the counterfactual true: the actual world facts regarding the wiring of the buttons and missiles.

The example above shows that we have intuitions with respect to the situations counterfactuals are about. We can identify them. This is important for a theory that claims that we make reference to such situations when judging a counterfactual true. In the next section we will examine arguments that show that an analysis stated in terms of the situations counterfactuals are about makes better predictions than global similarity.

4 Global similarity vs. Local similarity

Whether we make use of global similarity (to identify the most similar worlds) or local similarity (to identify counterparts of situations), we always appeal to context-dependent notions of similarity. Does it really matter which one we choose? In this section I will argue that the answer is 'yes', presenting data supporting a local similarity view.

4.1 The case of multiple counterparts

Lewis' theory of counterparts provides us with a way to understand how we identify individuals across possible worlds even though an individual is part of at most one world. According to Lewis, modal predicates are made true of an individual by what happens to his/ her counterparts. An individual's counterparts are identified on the basis of similarity, and one of the well-known features of Lewis' proposal is that an individual may end up with multiple counterparts in one world. In his 1973 book, Lewis presents an example with a man called Ripov. According to Lewis, Ripov bribed the judges to win. We are asked to consider (21) (Lewis 1973: 36):

(21) If he had reformed, he would have confessed.

As Lewis notes, predicated *de re* about Ripov, (21) will be true if in the most similar worlds in which Ripov's counterpart reforms, he confesses. But Lewis asks the following question:

(22) *What if he has multiple counterparts at one of the closest worlds where he vicariously reforms? It is not enough if one reforms and another one confesses; it is not even enough if one reforms and confesses and another reforms without confessing. What we must require is that at every closest world where one of*

> *Ripov's counterparts reforms all of those who reform also confess – that is, none reform without confessing.* (Lewis 1973: 42)

What we learn from this example is that in cases of *de re* predication, if there is more than one counterpart to the *res*, then all counterparts must satisfy the predicate. With this diagnostic in mind, we turn to situations. Consider the following example:

(23) *Smith makes candied apples and popcorn that he sells in the park. One particular day he only makes one candied apple, which he accidentally poisons. He doesn't sell it, and it gets thrown away.*

If a child had eaten a candied apple, he would have died.

The actual world situation that supports the truth of the counterfactual in (23), the situation it is about (*res*), includes Smith selling the candied apples he makes in the park, his making of a poisoned apple, etc. Imagine a world in which there are two Smiths and two toxic apples have been made. In such a world, the situation the counterfactual is about has two counterparts. We will only judge the counterfactual true if both situations are such that if a child eats the candied apple that Smith has made in that situation, the child dies. If a child eats the apple in one of the counterpart situations and lives, the counterfactual in (23) will be judged false.

This type of example supports the proposal in (10), which puts restrictions on both worlds that contain the *res* situation and smaller situations that contain the *res* situation. By doing so, (10) forces us to consider all counterparts of the *res* situation separately (we quantify over all situations that contain it).[1]

What does a possible worlds analysis say about multiple counterpart scenarios? One option would be to claim that worlds with multiple counterparts of the *res* situation are too different from the actual world to be relevant antecedent worlds. But this gives no explanation for the robust intuition that both counterparts matter. Another option would be to claim that in examples like (23) quantification proceeds over worlds as usual and that it is the situations restricting the domain of quantification of the DP that are responsible for multiple counterparts. The relation between domains of quantification and the situations that support the truth of a counterfactual is an important issue, but I must leave it unexplored here. The second option remains open for future investigation.

4.2 Two final comparisons

4.2.1 Inference patterns

[1]The proposal itself does not guarantee that the antecedent and consequent situations will be matched appropriately. Something else would need to be said to account for this. The reader is referred to Rothstein (1995).

One of the important triumphs of a g-similarity Lewis-Stalnaker style analysis is that it provides us with an explanation for the failure of certain inference patterns. Examples are provided in (24):

(24) a. *Contraposition* (attributed to Kratzer in von Fintel 2001)
(i) (even) if Goethe hadn't died in 1832, he would still be dead now.
(ii) (therefore) if Goethe were alive now, he would have died in 1832.
b. *Strengthening of the antecedent* (Lewis 1973)
(i) If the US threw its weapons into the sea, there would be war.
(ii) (therefore) If the US and Russia threw their weapons into the sea, there would be war.
c. *Syllogism* (Stalnaker 1968)
(i) If Hoover had been born in Russia, he would have been a Communist.
(ii) If Hoover had been a Communist, he would have been a traitor.
(iii) (therefore) If Hoover had been born in Russia, he would have been a traitor.

A *de re* analysis also makes correct predictions regarding the patterns in (24): the fact that there is a situation that supports the truth of one conditional does not guarantee that there is a situation supporting the truth of the other one. For example, the existence of features in the actual world (the belligerent attitude of superpowers), extended to a situation in which the US throws its weapons into the sea, will lead us (via well-known regularities) to a situation in which there is war. But that does not itself guarantee that there exist features in the actual world which, extended to a situation in which the US and Russia throw their weapons into the sea will lead us (via regularities) to a situation in which there is war. The pattern in (b) is not predicted to be valid. And the same kind of reasoning will make correct predictions regarding (a) and (c).

4.2.2 A problem of *packaging*

In this section I will include some remarks on a well-known problem in the semantics of counterfactuals. It has been noted that when identifying the quantificational domain of counterfactuals, some features of the world pattern together and others separate more freely. I will refer to this as the *packaging* problem. (The packaging problem has been addressed in other frameworks with the notions of 'lumping' (Kratzer 1989) and 'retraction' (Veltman 2005). Working within a Lewis-Stalnaker style analysis, Bennett (2003) appeals to 'causal chains'.) To see packaging at work, consider the contrast between the examples below:

(25) Peter presses the button in a completely random coin-tossing device, and the coin comes up heads.
(a) If Susan had pressed the button, the coin would have come up heads.

(26) A friend wants to make a bet with you, offering you odds that the coin will not come up heads. You refuse. Your friend presses the lever in the completely random coin tossing device, and the coin does come up heads. Your friend says:
(a) If you had bet heads, you would have won.
(Tichy-inspired examples by Bennett (Bennett 2003: 234-236))

Our intuitions tell us that (25) is false, but (26) is true. How is this to be explained? We could describe our intuitions as follows: in the case of (25) the claims is about circumstances in which the pressing of the button is different than it actually is, and so the outcome could also be different. In the case of (26) the claim is about circumstances in which the pressing of the button is as it actually is, so the outcome is the same. The outcome of the pressing of the button is 'packaged' together with the pressing itself.

What does the *de re* analysis say about the contrast between (25) and (26)? In both cases there are features in the world that would in principle make the counterfactual true, namely, the fact that the coin actually came up heads. If we let *past* refer to such features in both cases, we will make the wrong predictions. Obviously, the problem is with (25). What kind of (principled) reason could there be for *past* in (25) not to refer to the actual world features that the coin came up heads? It could be a pragmatic constraint: *the denotation of past cannot be resolved in such a way that it makes the counterfactual true by itself (independently of the laws invoked by the modal).* However, while this makes some intuitive sense, there are examples that point against such a constraint. Consider (27) and (28):

(27) The straps in the baby seat are very sturdy, and the cushioning is excellent.
(a) So, if the baby had turned over, she would have been safe.

(28) One parent: How could you drive so carelessly! The baby could have turned over!
Other parent (*annoyed*): Well, if the baby had turned over, she would have been strapped into a safe seat.

The features of the actual world that make the counterfactuals true in both cases are the fact(s) that the baby is strapped safely to a very sturdy seat. This situation in itself makes the consequent true in both cases (these are examples of *even if* counterfactuals). And although the pragmatics of this kind of counterfactual is arguably different from others we have seen, there is nothing wrong with them. A general pragmatic prohibition against allowing *past* to denote a situation that makes the consequent true seems off the mark.

It seems that the constraint needed to explain the packaging facts illustrated in (25) must be sensitive to the relation between the antecedent and consequent clause. If the antecedent and consequent in principle are linked by laws/regularities, we cannot (felicitously) assign to *past* an interpretation that allows the truth of the counterfactual to bypass those laws.

5 Conclusion

I have presented a proposal that generalizes a *de re* analysis to all counterfactuals. It targets the idea that counterfactuals are made true by 'certain facts', and works with the hypothesis that the semantics of counterfactuals should be stated in terms of the facts counterfactuals are about. The proposal has the theoretical advantage of providing an explanation for the presence of past tense in counterfactuals, and the empirical advantage of capturing our intuitions in cases of multiple counterparts.

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Dislocating NPs to the Right: Anything Goes? Semantic and Pragmatic Constraints *

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Abstract

In our paper we investigate the semantics and pragmatics of the NP-right dislocation (RD) in German, concentrating in particular on the conditions under which dislocation is possible. We argue that semantic properties of the NP are relevant for the possibility of having an NP dislocated: it has to have a type <e> denotation. This requirement allows particular definite NPs as well as kind-referring terms and excludes quantified NPs. We propose a semantic account of RD in terms of 'separate performatives' thereby explaining the distributional facts. Furthermore, we show how the function of RD as a discourse topic marker endorses the requirement of the type <e> denotation for the RD-NP.

1 Introduction

Among discourse structuring strategies German inter alia allows for NP-right dislocation (= RD) as exemplified in (1):

(1) Sie geht jeden Tag joggen, meine Schwester.
She$_i$ goes every day jogging [my sister]$_i$

According to Averintseva-Klisch (2007), German RDs exhibit the following properties: formally, they consist of an NP at the right end of a clause and a coreferent pronoun inside the clause. RDs are prosodically and syntactically part of their host sentence.

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Pragmatically, they mark the current discourse topic referent. These characteristics distinguish RDs from so called Afterthoughts, which are prosodically and syntactically independent NPs resolving a potentially unclear prononimal reference, cf. (2):

(2) (context: Peter$_1$ and Karl$_2$ returned from their holidays.)
   a. Hast Du ihn$_?$ schon gesehen, | (ich meine) den KARL$_2$?
      Have you him$_?$ already seen, PAUSE (I mean) [the Karl.ACCENT]$_2$

Whereas Afterthoughts are morphosyntactically and semantically unrestricted, RDs do not allow for every NP-type. In the present paper we will address the semantics and pragmatics of RD, focussing in particular on the conditions under which dislocation is possible.

In his seminal work on dislocation in German, Altmann (1981) primarily relies on morphosyntactic criteria. He suggests that only definite particular NPs like in (1) are possible instantiations of RD. He supports this claim with ill-formed indefinite examples like (3):

(3) Er ging vorbei, *ein Student.
   he$_i$ went along [a student]$_i$

However, it has not been noticed that the picture becomes more complex taking into account generic contexts. Look at (4) for illustration:

(4) (context: Modern women are very conscious of their health. They eat nothing fat nor sweet.)
   a. Sie geht jeden Tag joggen, die moderne Frau.
      she$_i$ goes every day jogging [the modern woman]$_i$
   b. Sie gehen jeden Tag joggen, moderne Frauen.
      they$_i$ go every day jogging [modern women]$_i$
   c. Sie geht jeden Tag joggen, *eine moderne Frau.
      she$_i$ goes every day jogging [a modern woman]$_i$

As expected, definites are also well-formed in generic contexts, cf. (4-a). Surprisingly though, there is a significant split within the group of indefinites. Contra Altmann's prediction, bare plurals are grammatical in RD-position while being formally indefinite, cf. (4-b).[1] But generics do not render all NP-types grammatical in dislocation: the indefinite singular is still ruled out, cf. (4-c).

These facts are supplemented by another observation not properly captured in the literature. As illustrated in (5), overtly quantified NPs cannot surface in RD-position:

[1] Altmann remarks that as an exception indefinite NPs are possible in what he calls 'defining contexts'. This resembles our observation. But Altmann neither discusses the exact conditions of these data nor gives a principled explanation for them.

(5) Sie gehen jeden Tag joggen, *alle / *manche / *viele Frauen.
they$_i$ go every day jogging [all / some / many women]$_i$

In our paper, we aim at covering these distributional data in a principled manner. Section 2 is concerned with central semantic properties of an NP allowing it to be right-dislocated. Starting out with standard assumptions on generics, it will be argued that only type <e> denotations are possible candidates for RD. In Section 3 we will analyse RDs as a separate 'meaning dimension' in the sense of Potts (2005, 2007) and Portner (2007) thereby explaining the need for a semantically self-contained NP provided by <e> denotations. Section 4 connects the formal type <e> constraint to the function of RD as a dicourse topic marking device.

2 Type <e> generalization

Following Krifka et al. (1995) one standardly distinguishes between 'kind-referring NPs' and 'characterizing sentences' as two types of genericity in natural language. Kind-referring NPs are analysed as proper names. Sentences containing them can thus be represented as direct predication over a kind-individual, cf. (6) and (7):

(6) a. Die Dronte ist ausgestorben.
the dodo is extinct
b. Dronten sind ausgestorben.
dodos are extinct

(7) EXTINCT (dodo$_{\text{KIND}}$)

The examples in (6) suggest that in languages like German and English both definite singulars and bare plurals potentially refer to entities of the ontological sort 'kind'.[2] Indefinite singulars on the contrary do not allow for direct kind reference. As shown in (8), they are incompatible with a kind-selecting predicate like *to be extinct*:[3]

(8) *Eine Dronte ist augestorben.
a dodo is extinct

[2]In the literature there is an extensive discussion on the exact modelling of kind-referring terms and their relation to particular instances. Especially the default reference of bare plurals is under debate, cf. Carlson (1977), Krifka et al. (1995), Chierchia (1998), Krifka (2004), to name but a few. We are only concerned with the descriptive fact that definite singulars and bare plurals *can* refer to kinds, no matter how the kind-reference is derived.

[3]Taxonomic readings are a systematic exception to this: *A dog is extinct* is grammatical if *a dog* refers to a subkind of the superordinate kind *Canidae*, e.g. the wolf (*Canis lupus*). Taxonomic NPs display the whole gamut of syntactic configurations known for every count noun. Since their semantics have to be modelled in their own fashion, we ignore them in the present study (cf. Krifka et al. 1995 for details). The assumption that indefinite singulars are never kind denoting has been challenged in Dayal (2004) and Müller-Reichau (2006). However, we follow the standard analysis given above.

However, indefinite singulars are grammatical in case of characterizing sentences, cf. (9):

(9) Ein Löwe brüllt.
a lion roars

(10) GEN (x,s) [lion (x) & s is a typical situation wrt roaring & s contains x; x roars in s]
(reads as: If x is a lion and s is a typical situation with regard to roaring and s contains x, then x roars in s)

As exemplified in (10), the generic interpretation of characterizing sentences arises due to a silent dyadic operator called GEN, hence involving quantification over entities. Note that in this case the generic force does not depend on the NP *ein Löwe*. Summing up so far we get a split within the class of indefinites: whereas bare plurals are potentially generic by themselves, indefinite singulars as such have no generic potential.

We assume that this difference can explain the data on Right Dislocation, repeated in (11):

(11) (context: Modern women are very conscious of their health. They eat nothing fat nor sweet.)
a. Sie geht jeden Tag joggen, die moderne Frau.
she$_i$ goes every day jogging [the modern woman]$_i$
b. Sie gehen jeden Tag joggen, moderne Frauen.
they$_i$ go every day jogging [modern women]$_i$
c. Sie geht jeden Tag joggen, *eine moderne Frau.
she$_i$ goes every day jogging [a modern woman]$_i$

For generics, RD-NPs have to be kind-referring terms. The formal definite-indefinite distinction is not crucial. Definite singulars and indefinite plurals are allowed in RD-position since they potentially refer to kind-individuals, cf. (11-a) and (11-b), indefinite singulars are ruled out since they do not, cf. (11-c).[4]

[4]Krifka et al. (1995, 11) confine genuine kind-reference to well-established kinds invoking the following contrast in case of definite singulars:

(i) a. The Coke bottle has a narrow neck.
b. ??The green bottle has a narrow neck.

One might wonder if 'modern women' are conceivably interpreted as a well-established kind in this sense. Krifka et al. (1995, 70) note that it is quite difficult to specify when a language promotes an NP to a kind-term. Furthermore, they raise the ontologically motivated question if kinds are created and destroyed by language itself. We in fact think that in appropriate contexts like the one given in (11) a promotion to kind-reference can be accomodated quite fast: the NP 'modern women' might differ in certain aspects from typical well-established natural kinds like *Canis lupus*, but at least for the discourse segment under discussion the corresponding NP is enhanced to a name for a specific type of individual entity. Remark that even the definite singular – the least disputable case of direct kind-reference – is possible, cf. (11-a). In addition, one has to keep in mind that there is considerable disagreement what bare plurals in the default case refer to; see footnote 2 for further literature.

Recalling that the generic reading in case of indefinite singulars arises due to the generic quantifier GEN, we hypothesize that quantifying in dislocated NPs is ruled out. This suits well the observation that overtly quantified RD-NPs are generally ill-formed, cf. the repeated example (12):

(12) Sie gehen jeden Tag joggen, *alle / *manche / *viele Frauen.
they$_i$ go every day jogging [all / some / many women]$_i$

Speaking in terms of semantic types, one can capture the data by assuming that in RD only NPs of type <e> are licensed. Semantically, this assumption is based on the idea that RD-NPs are not open formulas, but expressions referring to specific individual entities be they particular objects or kinds. The corresponding restriction is stated in (13). It correctly predicts that both definite NPs and kind-referring NPs are grammatical in RD, irrespective of their ontologically motivated different sortal status, cf. (14):

(13) *Type <e> generalization*
a. (...) pron$_i$ (...) RD-NP$_i$$^{<e>}$
b. *(...) pron$_i$ (...) RD-NP$_i$$^{<<e,t>, t>}$

(14) a. Sie geht jeden Tag joggen, meine Schwester$_i$$^{<e_{object}>}$
she$_i$ goes every day jogging [my sister]$_i$
b. Sie gehen jeden Tag joggen, moderne Frauen$_i$$^{<e_{kind}>}$
they$_i$ go every day jogging [modern women]$_i$

One may ask why it should be the case that only type <e> NPs are allowed in RD. In order to be interpretable, NPs of type <<e,t>, t> call for functional connection to the sentence they are part of. A corresponding compositional derivation however is blocked in (13-b) because there is no quantifying 'in' or 'out' of the RD-NP. Hence open formulas in RD cannot be connected via functional application to the rest of the sentence and are therefore ill-formed. In contrast, (13-a) is grammatical because an RD-NP of type <e> has its own referential force, i.e. it doesn't call for being part of the compositionally derived meaning of the clause.

This analysis seems conclusive. But it leads to a follow-up question: in which way other than compositional derivation does the RD-NP contribute to the meaning of the clause? We propose that analysing RD as a separate meaning dimension correctly captures the specific meaning contribution of RD-NPs. This analysis will be discussed in section 3 and refine our understanding of RDs as self-contained semantic expressions.

3 RD as separate meaning dimension

3.1 Separate performative account

Following Potts (2005, 2007), Portner (2007) distinguishes between two separate dimensions of meaning sentences might have: (i) 'at issue-meaning', which is the compositionally generated semantic content of the utterance and (ii) 'separate performative', i.e. an additional meaning which is a separate speech act, supplying instructions for the interpretation of the semantic content.[5] For instance, Portner (2007, 412ff) assumes that NP appositions like in (15) introduce a separate performative:

(15) Amir, my new neighbour, is from Israel.

By uttering (15) the speaker makes two speech acts: first, he asserts that Amir is from Israel, which is the regular 'at-issue' meaning of the sentence in (15). Second, in a separate speech act he *performs* the assertion that Amir is his new neighbour:

(16) Amir, my new neighbour, is from Israel.
at-issue meaning: [λw. FROM ISRAEL (Amir) in a given world w]
separate performative: {[λw. the speaker thereby asserts that Amir is his new neighbour in w]}

As all performatives a separate performative does not influence the truth conditions of the sentence since it is automatically true when understood. Potts (2007, 477) presents data from embedded structures providing additional evidence for the separate character of appositions. He shows that they are semantically non-embeddable. So, in (17), the separate performative can be only contributed to the speaker of the main clause but not to Felix:

(17) As Felix said, Amir, his new neighbour, is from Israel.
= Felix said that Amir is from Israel.

[5] Portner (2007) uses two terms for the separate meaning dimension: 'separate performative' as well as 'expressive meaning'. The first term captures the character of a separate meaning, i.e. the idea of a separately performed speech act not influencing the truth condition of the whole sentence. That is why we adopt the term 'separate performative' in our paper.

The term 'expressive meaning' might be misleading since the separate meaning does not necessarily have to be expressive in the proper sense of the word. Portner (2007) takes this term from Potts (2005), who uses it describing the meaning of expressive units like *lovely vase* or *this damn thing*. Generalizing from the behaviour of expressives onto other phenomena, Potts formulates the assumption of two separate meaning dimensions. For Potts (2005, 2007), expressive meanings build a subclass of conventional implicatures; for these he advocates an analysis as a separate meaning dimension in the sense introduced above. Potts' original analysis of conventional implicatures is explicitly one as a semantic, and not a pragmatic phenomenon. This issue depends on independent theoretical assumptions about the exact place of the boundary between semantics and pragmatics. Without taking any far-reaching theoretical obligations, we understand the complete meaning of the sentence as being a pair of at-issue meaning and separate performative.

≠ Felix said that Amir is his new neighbour (and that Amir is from Israel).

A meaning of a given sentence S is accordingly a set of two meaning dimensions, cf. (18):

(18) meaning for a sentence S: <A_S, C_S>
   a. A_S: at-issue meaning of S
   b. C_S: set of separate performatives of S (C_S: {$C1_S$, $C2_S$, ...}) (cf. Portner 2007, 413)

Whereas A_S is constituted compositionally, C_S is a simple sum of separate performatives.

3.2 RD as separate performative

Returning to RD we argue that RD does not take part in the compositional making up of the utterance meaning. In the given context, the semantic content of (19-a) with RD or (19-b) without RD is exactly the same: the predication 'GO JOGGING EVERY day' is applied to the argument 'they' which in turn is identifiable with 'modern women' via an equivalence relation in the discourse model, cf. (20). Note that in the given context the reference is unambigous.

(19) Moderne Frauen sind sehr gesundheitsbewusst. Sie essen weder
[Modern women]$_i$ are very conscious-of-their-health. They$_i$ eat neither
Fett noch Süßes.
fat nor sweet.
   a. Sie gehen jeden Tag joggen.
they$_i$ go every day jogging
   b. Sie gehen jeden Tag joggen, moderne Frauen.
they$_i$ go every day jogging [modern women]$_i$

(20) A_S for (19-a) and (19-b): [λwλx. GO JOGGING EVERY DAY (x) in w, x = y, MODERN WOMEN (y)][6]

What the RD contributes is the separate meaning dimension, instantiated as a signal to the addressee to activate (or to hold activated)[7] the mental representation of modern women, cf. (21).

(21) Sie gehen jeden Tag joggen, moderne Frauen.
they$_i$ go every day jogging [modern women]$_i$

[6]This informal DRT-oriented A_S (cf. Kamp and Reyle 1993) is meant to capture the idea that the referent of the anaphor is introduced in the previous context and connected to it via equivalence relation. Crucially, x is not a predicate but an individual according to this representation.

[7]It is possible to mark the maintenance of the old discourse topic as well as to promote some discourse referent to the new discourse topic with RD (cf. Averintseva-Klisch 2006).

a. A_S: [λwλx. GO JOGGING EVERY DAY (x), x = y, MODERN WOMEN (y)]
b. C_S introduced by RD-NP: {[λzλw. signal to the adressee z to hold activated the mental representation of the modern women in w]}[8]

To return to the quantification: as we have shown, quantified NPs are excluded in RD, cf. repeated (22):

(22) a. *Sie gehen jeden Tag joggen, alle / manche / viele Frauen.
they$_i$ go every day jogging [all / some / many women]$_i$
b. *Sie geht jeden Tag joggen, eine moderne Frau.
she$_i$ goes every day jogging [a modern woman]$_i$

Portner (2007, 411) notices that in a similar way quantifiers are in general unable to function as vocatives, cf. (23-a) vs. (23-b):[9]

(23) a. Anna, please, hurry up!
b. *Some woman, please, hurry up!

Vocatives, like RD, introduce a separate performative meaning so that Portner (2007, 414) assumes the semantics of (23-a) to be like in (24):

(24) Anna, hurry up!
a. A_S: [λx λw. the speaker urges the addressee x to hurry up in w]
b. C_S: {[λw. the speaker requests Anna's attention in w]}

The point here is that both for RD and vocative it is impossible to have a quantifier in one dimension and the quantified expression in the other. Obviously, if the separate performative contains a quantifier, this quantifier cannot search for variables at the at-issue-meaning and would thus stay an open formula through the completion of the meaning computation. In other words, it is necessary for both meaning dimensions to be saturated independently of each other. This corresponds to the descriptive generalization made in section 2 that RD-NPs have to be semantically of type <e> (no matter whether <e_{object}> or <e_{kind}>, as we have argued above). Given the analysis at hand, this is not an idiosyncratic peculiarity of RD, but follows immediately from the fact that RD introduces a separate performative.

Accordingly, we would expect other constructions introducing separate performatives to disallow quantifying across meaning dimensions too. As shown above, this is indeed

[8]Example (21) shows that meaning dimensions as understood here cannot be compared with the differentiation of the context-free underspecified 'semantic form' and 'conceptual structure' that includes context-driven specifications of the meaning, as proposed by Bierwisch (1987). The separate performative is the semantic contribution of RD-NP to the meaning of the clause, which is specific to a particular linguistic construction and thus independent of the particular context.

[9]The same seems to be true of NP appositions, as Potts (2007, 494) argues. However, there are some peculiarities in need of further clarification.

the case with vocatives. Moreover, we receive additional evidence from the so-called 'Hanging topic' construction (= HT) in German (cf. Frey 2004). This is a construction in which a prosodically and syntactically autonomous NP, optionally combined with an addition like *à propos / zum Thema* ('concerning / talking about'), etc. is added to the left of the clause, and there is a resumptive clause-internal pro-form inside the clause, as in (25):

(25) Moderne Frauen, sie gehen oft joggen.
[modern women]$_i$ they$_i$ go often jogging

It has been previously shown that HT also introduces a separate performative meaning (cf. Portner (2007) for English and Averintseva-Klisch (2006) for German), so we would expect, that HT disallows quantified NPs too. This is indeed the case, cf. (26):

(26) *(*A propos) alle / viele / manche Frauen, sie gehen oft joggen.
to concern [all / many / some women]$_i$ they$_i$ go often jogging
'*(*Talking about) all/many women, they often jog.'

Interestingly, a quantified phrase can occur in a HT construction only if it has a metalinguistic reading so that *alle / viele Frauen* ('all / many women') is a quotation, cf. (27):

(27) A propos "alle Frauen", das ist / *die sind wieder so ein typisches
to concern ["all women"]$_i$ that$_i$ is / *they$_i$ are again such a typical
Klischee.
cliché

This is, however, precisely the case where the quantified phrase has been shifted to a type <e> denotation.

Furthermore, Hanging Topic constructions allow us to argue against the assumption that solely the type incompatibility of the pronominal NP *sie* ('they') (type <e>) and the quantified NP *alle Frauen* ('all women') (type <<e,t>t>) prohibits the semantic coindexing of these NPs. If the linear order of the NPs is 'quantified NP – pronominal NP', then generally coindexing is possible, as in (28):

(28) Alle Frauen sind gesundheitsbewusst. Sie gehen gern joggen.
[all women]$_i$ are conscious-of-their-health. they$_i$ go eagerly jogging

However, in case of HT coindexing is excluded. Hence, the linear order cannot be responsible for allowing or disallowing operations like quantification or binding. Instead, the assignment to different meaning dimensions forbids the necessary semantic operations. This makes it plausible that also in case of RD it is the separation of meaning

dimensions which is decisive.[10]

To sum up: we can explain the type <e> generalization via assuming the analysis of RD as constituting a separate meaning dimension. However, there is one case, namely proper names, that seems to constitute a counterevidence to the type <e> account of the RD-NP, as we will show in the following.

3.3 RD and proper names

In German, proper names, in particular personal forenames like *Susanne* or *Peter*, are generally used without article. Since PNs are usually considered to be prototypical type <e> denotations, the proposed type <e> generalization predicts them to be fine in RD. However, this is not the case: PNs are ruled out in RD, cf. (29):

(29) Sie geht jeden Tag joggen, *Anna / *Christine.
[she]$_i$ goes every day jogging *Anna / *Christine

Proper names thus present a problem for an account that is solely based on type semantics since PNs and ordinary definite description like *the woman* do not differ semantically. However, it is well-known that they differ in their discourse pragmatic characteristics: PNs are generally assumed to be context-independently, i.e. externally anchored (cf. Kamp and Reyle 1993). In contrast, the reference of definite descriptions is taken to be context-dependent in that the definite article presupposes that the NP it takes denotes a salient singleton set in a given context (cf. Farkas 2002, 215ff).

This reasoning suggests that discourse-pragmatic factors additionally constrain the choice of RD-NPs. In order to substantiate this claim we will in the following consider the discourse function of RD in detail.

4 The discourse function of RD

We assume that every discourse segment has a discourse topic, which may either stay implicit or be explicitly marked.[11] One such explicit linguistic device to mark the current discourse topic is the RD. This is exemplified in (30), where the right-dislocated NP marks explicitly the carp referent as the topic for the following segment (which is a detailed description of the carp, its habits and its looks; cf. also Averintseva-Klisch 2006, 2007).

[10]We could not test this issue directly with RD because of independent constraints on anaphoric chains, cf. Consten and Schwarz-Friesel (2007).

[11]Note that we clearly distinguish between discourse topic as a referent and sentence topic which is obligatorily bound to a certain expression having a particular structural position. Thus, for German, the 'vorfeld' (Molnár 1991) and the position in the 'mittelfeld' immediately above the base position of sentence adverbials (Frey 2004) have been proposed as sentence topic positions. Discourse topics tend to be resumed as sentence topics, but this is a tendency and not a necessity, cf. also Tomlin et al. (1997).

(30) Wer weiß, wie beschwerlich der Heimweg für ihn$_k$ und den Jungen geworden wäre, wenn ihnen das Glück nicht den Karpfen Cyprinus$_i$ zur Hilfe geschickt hätte! Ahnungslos kam er$_i$ dahergeschwommen, der Karpfen Cyprinus$_i$. Er$_i$ war schon ein alter Herr, hatte Moos auf dem Rücken und liebte es, während des Schwimmens stillvergnügt vor sich$_i$ hin zu blubbern. (O. Preussler, Der kleine Wassermann)
'Who knows, how hard the way home would have been for him$_k$ and the boy, if fortune had not sent [the carp Cyprinus]$_i$ to help them. He came swimming along suspecting nothing, [the carp Cyprinus]$_i$. He$_i$ was an elderly gentleman with moss on his back and (he$_i$) loved bubbling along joyfully while swimming.'

The theoretical status of discourse topics has been extensively discussed in the literature. In particular, discourse topics have been analysed as a proposition (cf. Asher 1993, 2004), as a question the discourse answers (cf. von Stutterheim and Klein 2002, Büring 2003) or as an entity (cf. Dik 1997). Given the independently motivated idea that RDs mark the discourse topic, the type <e> restriction on RD supports the entity based analysis of the discourse topic. More specifically, this entity presumably is a person- or object-referring discourse referent. Thus we understand discourse topic as the discourse referent that is most salient in terms of stable activation in the current discourse segment.[12]

Since the RD-NP is an explicit marker of the discourse topic, we argue for the following minimal condition: it has to be assured that the corresponding referent is anchored within the discourse model. This requirement of internal anchoring is fulfilled in case of definite descriptions since these are by definition interpreted only within a particular discourse model. Crucially, as we argued above, this does not hold for PNs as they are only externally anchored. This explains why PNs are ungrammatical in RD position.

It is well known though, that German allows for PNs with a definite article, as in (31) from von Heusinger and Wespel (2007, 332):

(31) Der George Bush bricht nicht sein Ehrenwort.
the George Bush breaks not his word

In general, the use of a definite article with PNs in German is considered purely optional (or, to be more exact, to be a matter of dialectal or stilistic variation; e.g. Farkas 2002, von Heusinger and Wespel 2007). Interestingly, PNs with definite article are licensed in RD, cf. (32):

(32) Sie geht jeden Tag joggen, die Anna / die Christine.
[she]$_i$ goes every day jogging [the Anna]$_i$ / [the Christine]$_i$

We argue that the definite article functions as an explicit device to anchor PNs within the discourse model, leading to a change of the discourse status of the corresponding

[12]By discourse segment we understand a relatively small, thematically contiguous part of a discourse; roughly, a discourse segment is minimally an utterance, or, as is more often the case, several interrelated utterances.

referent: it is not anymore externally, but internally anchored thereby fulfilling the discourse pragmatic condition for RD-NPs given above.[13]

Our analysis predicts that in other explicit discourse topic marking constructions the distribution of PNs should be parallel. As Frey (2004) shows, Hanging Topic in German is such a construction as it is used to mark a change of the current discourse topic. In fact, PNs are ungrammatical as Hanging Topics, cf. (33-a), unless they are anchored analogously to the RD with a definite article, cf. (33-b). Alternatively, the anchoring can occur with lexical means, e.g. the addition *a propos* ('talking about') like in (33-c):[14]

(33) a. *Christine, ich habe sie gerade getroffen.
Christine I have her just met
b. Die Christine, ich habe sie gerade getroffen.
the Christine I have her just met
c. A propos Christine, ich habe sie gerade getroffen.
to concern Christine I have her just met

Two caveats are to be made here: first, we assume that the request of explicit anchoring in the discourse applies only to overt marking of the discourse topic through a specific linguistic construction like RD or Hanging Topic. It is of course possible to talk about a person and to refer to it with a bare PN (although even here the variant with the definite article might be preferred), as long as the corresponding referent is only the implicit discourse topic, cf. (34):

(34) (Die) Christine ist sehr gesundheitsbewusst. Sie isst weder Fett noch
(the) Christine is very conscious-of-her-health she eats neither fat nor
Süßes. Jeden Donnerstag geht sie schwimmen. Ja, und dreimal pro
sweet every thursday goes she swimming yes, and three-times per
Woche geht (die) Christine joggen.
week goes (the) Christine jogging

Second, the requirement of explicit anchoring for PN in discourse topic marking constructions is proposed for German. We expect it to be generally valid in languages which allow in a similar way for both bare PNs and PNs with definite article. We do not make any predictions for languages that either do not allow or necessarily request an article with PNs. Further investigations might be worthwhile.

To sum up this section: we have shown that the type <e> constraint on the RD-NP still holds, but it has to be supplemented with discourse-pragmatic considerations. As RD explicitly marks the current discourse topic, the corresponding referent has to be

[13]Note that the requirement of the definite article is not due to prosodic considerations here; prosodically, the NP *die Anna* behaves exactly like bare name *Christine*, both being instances of amphibrachic structures, cf. also the prosodic minimal pair *die Jana* ('the Jana') vs. *Diana*. The ungrammaticality of bare PNs in RD-NP applies irrespective of their length and accenting.

[14]This option is not available for RD out of independent syntactic and prosodic reasons, cf. Averintseva-Klisch (2006).

anchored in the discourse model either inherently or via an overt device like the definite article.[15]

5 Conclusion

It is not primarily the morphosyntactic distinction between definite and indefinite NPs that is crucial for right-dislocating, but semantic properties of the NP: the RD-NP is restricted to <e> type denotations, thereby excluding quantified NPs and allowing NPs referring to object individuals and kind individuals. Semantically, these findings can be traced back to a bipartite meaning analysis, differentiating between at-issue-meaning and separate performative: RD-NPs merely add a separate performative without being part of the compositional meaning of the clause. Therefore open formulas are out and only type <e> denotations are well-formed.

Pragmatically, RD is an explicit discourse topic marking device. Hence we argued for the following pragmatic constraint supplementing the semantic type <e> restriction: the referent of the RD-NP has to be internally anchored in the dicourse model. This condition explains the ungrammaticality of bare PNs in RD. At the same time it correctly predicts that PNs with a definite article are well-formed in RD since the article functions as an overt anchor.

Furthermore, our analysis of RD might contribute to the more general issue of the theoretical status of discourse topics. If one buys the assumption of RD as an overt discourse topic marker, then the fact that RD allows only type <e> entities is strong evidence for theories defining discourse topic as a person- or object-referring discourse referent.

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[15] In light of the given restriction on ordinary bare PNs in RD, a question arises with regard to the exact modelling of kind terms. As mentioned in section 2, they are standardly analysed as a sort of proper names (cf. Krifka et al. 1995). Nevertheless, contrary to ordinary PNs they as such are well-formed in RD. We speculate that this difference is due to the decriptive content associated with kind terms. Although a term like *modern women* is interpretable as a name of a particular kind, the predicative character of the constituent parts is presumably still present. This suits well the assumption that kind terms like *modern women* are ad hoc constructed within the progression of a particular discourse (cf. footnote 4). Therefore, kind terms allow internal anchoring not available for ordinary PNs.

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Uniqueness Effects in Correlatives*

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Abstract

The paper argues that the variability of the uniqueness effects exhibited by Hindi and Romanian correlatives is due to their mixed referential and quantificational nature. The account involves an articulated notion of quantification, independently motivated by donkey anaphora and quantificational subordination and consisting of both (discourse) referential components and non-referential components (dynamic operators over plural info states). The variable uniqueness effects emerge out of the interaction between: (*i*) the semantics of wh-indefinites, singular anaphors and habitual morphology and (*ii*) the pragmatics of quantification, which allows for the selection of different levels of 'zoom-in' on the quantified-over objects.

1 Uniqueness Effects in Hindi and Romanian Correlatives

The goal of this paper is to account for the variability of the uniqueness effects associated with correlative constructions in Hindi and Romanian. Correlatives are "biclausal topic-comment structures […] [in which] the dependent clause introduces one or more topical referents to be commented on by the matrix clause, where each topical referent must be picked up by – correlated with – an anaphoric proform" (Bittner 2001: 39). The examples in (1) (Hindi) and (2, 3) (Romanian) below are single wh-topic correlatives, while (4) (Hindi) and (5) (Romanian) are multiple wh-topic correlatives.

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(1) definite interpretation – Hindi (based on Dayal 1996):

jo	laRkii	lambii	hai,	vo	khaRii	hai.
which	girl	tall	be.prs,	that one	standing	be.prs

'The one girl that is tall is standing.'

(2) definite interpretation – Romanian:

Care	fată	şi=a=uitat	ieri	haina,
which	girl	her.Dat=HAS=forgotten	yesterday	coat.the,
pe	aceea	o=caută	tată-l	ei.
PE	that one	her.Acc=look for	father-the	her.Gen

'The father of the girl that forgot her coat yesterday is looking for her.'

(3) universal interpretation – Romanian:

Pe	care	om	l=a=interogat		Securitate-a,
PE	which	person	him.Acc=HAS=interrogated		security-the,
în	acela	nu=mai=am		încredere	
in	that one	not=anymore=HAVE.1sg		trust	

'I do not trust any person interrogated by the secret police anymore.'

(4) mixed universal & definite interpretation – Hindi (Dayal 1996)[1]:

jis	laRkii-ne	jis	laRke-ke	saath	khel-aa,
which	girl-Erg	which	boy-with	together	play-pfv
us-ne	us-ko	haraa-yaa.			
that one-Erg	that one-Acc	defeat-pfv			

'Every girl that played against a boy is such that (she played against exactly one boy and) she defeated the one boy she played against.'[2]

(5) universal interpretation – Romanian:

Cine	ce	mîncare	şi=a=adus,
Who	what	food	REFL.Dat=HAS=brought
pe	aceea	o =va=mînca.	
PE	that one	it.Acc=WILL.3sg eat	

'Everyone will eat whatever food they brought with them.'[3]

[1]There is speaker variation with respect to the readings associated with episodic multiple-topic correlatives in Hindi: some speakers agree with the claim in Dayal (1996) that sentence (4) has a mixed universal & definite reading, while others claim that (4) can have only an across-the-board definite reading: the (one) girl who played with the (one) boy defeated him. See fn. 12 below for more discussion.

[2]Dayal (1996) does not provide a translation that clearly locates the uniqueness effects in the nuclear scope of the *every* quantification, but my informants report that this is the correct translation – as opposed to the truth-conditionally distinct 'Every girl that played against exactly one boy defeated him', which locates the uniqueness effects in the restrictor of the *every* quantification.

[3]A more natural (colloquial) variant is: *Cine ce şi-a adus, aia o să mănînce* (Everyone will eat whatever they brought).

The main proposal is that the variation in interpretation (definite / unique vs. universal / non-unique) exhibited by these constructions follows from their ambivalent referential and quantificational nature, which is closely related to the ambivalent referential and quantificational nature of (wh) indefinites like *a* / *which frog* or definites like *the frog*. The account is formulated in a compositional dynamic system that is independently motivated by weak / strong donkey anaphora and quantificational / modal subordination (Plural Compositional DRT, Brasoveanu 2007). Crucially, PCDRT enables us to define an articulated notion of quantification that consists of distinct (discourse) referential components and non-referential components (operators over plural info states).

Thus, correlative constructions provide a window into the nature of reference and quantification in natural languages and are relevant for theories of how semantics interfaces with both syntax and pragmatics. On the syntax/semantics side, correlatives are interesting because, just like donkey sentences,[4] they have a quantifier-binding semantics without syntactic c-command. This is shown in (6) below[5], where Hindi – and, for all intents and purposes, Romanian – correlatives are analyzed as adjunction structures that are closely related to topicalization constructions like *Megan*^{x}*, I like her*$_x$ (indexation convention: superscripts on antecedents, subscripts on anaphors[6]).

(6) $[_{IP}\ [_{CP}$ which^x girl is standing] $[_{IP}$ that$_x$ one is tall]]

On the semantic/pragmatics side – which is our main focus here – correlatives display a universal vs. definite variation in interpretation both within a particular language and across languages. Intra-linguistic variation is exemplified by single vs. multiple topic correlatives in Hindi: *jo laRkii* (which girl) receives a definite / unique interpretation in (1) (single topic) and a universal / non-unique interpretation in (4) (multiple topic).

Also, compare the two Romanian single-topic correlatives: (2) has a definite / unique interpretation – it is infelicitous if there is more than one contextually salient girl who forgot her coat; (3) has a universal / non-unique interpretation – it is felicitous in the actual world, where more than one person was interrogated by the secret police. The definite correlative in (2) and the universal correlative in (3) are not morpho-syntactically different: in both cases, the subordinate clause is eventive *passé composé* and the matrix clause is stative present; that is, the difference in their interpretation is not due to their temporal-aspectual structure, e.g. generic present (*A dolphin eats fish and squid*) vs. episodic past (*A dolphin ate fish and squid*). So, this variation in

[4]That c-command (o-command, outranking etc.) is needed for quantifier binding is shown by the contrast between *Every*^{x} *boy recommended a book to his*$_x$ *friends* and *#Every boy who read every*^{x} *Harry Potter book recommended it*$_x$ *to his friends*. The minimally different example *Every boy who read a*^{x} *Harry Potter book recommended it*$_x$ *to his friends* shows that c-command is not needed for donkey anaphora.

[5]See Srivastav (1991) and Dayal (1995, 1996) and, also, Bhatt (2003) for a recent detailed discussion.

[6]Determiners are indexed because the non-determiner elements can be part of both antecedents and anaphors, e.g. *a* / *every frog* vs. *the* / *this* / *said frog*.

interpretation seems to be a pragmatic matter: we deal with regular, habitual phenomena in (3) and accidental, sporadic ones in (2) – and it is world knowledge, i.e. an extra-linguistic, pragmatic factor that enables us to make this distinction.

As far as variation across languages is concerned, the morphologically unrealized contrast between the interpretations of the Romanian correlatives in (2) and (3) is overtly marked in Hindi: Dayal (1995) notes that single-topic correlatives have a universal reading if we switch from episodic to habitual morphology, as in (7) below.

(7) universal interpretation with habitual morphology– Hindi:
jo laRkii lambii *ho-tii* hai, vo khaRii *ho-tii* hai.
which girl tall be-hab.f be.prs, that one standing be-hab.f be.prs
'A tall girl (generally) stands, e.g. in buses with very little leg room between seats.'

An informant remarks that, intuitively, (7) generalizes over situations in which there is a unique girl who is tall. About each such situation, we predicate that the girl in it stands.

Another instance of cross-linguistic variation is provided by multiple-topic correlatives, which have an across-the-board universal interpretation in Romanian[7] and a mixed universal & definite interpretation in Hindi.[8]

Thus, correlative constructions pose two problems: (*i*) the compositionality problem on the syntax/semantics side – in particular, the fact that the universal, quantificational reading does not require c-command and (*ii*) the 'uniqueness effects' variability on the semantics/pragmatics side – in particular, the connections between uniqueness effects on the one hand and, on the other hand, the semantics of habitual morphology in Hindi and the pragmatics of quantification at work in Romanian. The first problem is solved by taking a dynamic approach, which is specifically designed to compositionally capture syntactically non-local quantificational dependencies like donkey anaphora. We will not discuss the solution of this problem (see the appendix for all the relevant formal details), but instead focus on solving the second, semantics/pragmatics problem.

[7]This is clearer in examples like *Care ce problemă şi=a=ales, pe aceea o=va=rezolva* (Everyone will solve whatever problem, i.e. all & only the problems, they chose) or *Care ce subiect şi=a=ales, despre acela trebuie să=scrie* (Everyone must write about whatever topic, i.e. all & only the topics, they chose).
[8]If we look at triple-topic correlatives, we see that the generalization is as follows: the initial topic receives a universal interpretation and the other topics are unique relative to each value of the initial topic.

2 The Semantics of Hindi Single-Topic Correlatives

This section provides the analysis of the definite / unique vs. universal / non-unique interpretation of Hindi correlatives (sections **2.1** and **2.2**) and indicates how this analysis is formalized in Plural Compositional DRT (section **2.3**). Romanian correlatives and the cross-linguistic variation issues raised above are discussed in section **3**.

2.1 The Definite / Unique Interpretation

The Russellian analysis of definite descriptions derives their uniqueness by putting together a maximality and a singleton requirement, as shown in (8) below.

(8) The chair Leif brought is wobbly.

$$\underbrace{\exists x[\mathit{chair}(x) \wedge \mathit{bring}(\mathit{leif}, x)}_{\text{existence}} \wedge \underbrace{\underbrace{\forall y[\mathit{chair}(y) \wedge \mathit{bring}(\mathit{leif}, y)}_{\text{maximality}} \rightarrow \underbrace{y{=}x]}_{\text{singleton}}}_{\text{uniqueness}} \wedge \mathit{wobbly}(x)]$$

The analysis can be alternatively represented in terms of set variables, as shown in (9).

(9)
$$\underbrace{\exists X[X \neq \varnothing}_{\text{existence}} \wedge \underbrace{\underbrace{X = \{y\colon \mathit{chair}(y) \wedge \mathit{bring}(\mathit{leif}, y)\}}_{\text{maximality}} \wedge \underbrace{|X| = 1}_{\text{singleton}}}_{\text{uniqueness}} \wedge \mathit{wobbly}(X)]$$

I propose that the definite / unique interpretation of Hindi (and Romanian) correlatives arises as a consequence of (*i*) the maximality contributed by the wh-indefinite in the topic / subordinate clause, together with (*ii*) the singleton requirement contributed by the singular demonstrative in the comment / matrix clause, as (10) below shows:

(10) jo^X laRkii lambii hai, vo$_X$ khaRii hai.
which girl tall be.prs, that one standing be.prs

$$\exists X[X \neq \varnothing \wedge \underbrace{\underbrace{X = \{y\colon \mathit{girl}(y) \wedge \mathit{tall}(y)\}}_{\text{maximality}} \wedge \underbrace{|X| = 1}_{\text{singleton}}}_{\text{uniqueness}} \wedge \mathit{standing}(X)]$$

That is, our Hindi episodic single-topic correlative is interpreted as follows: (*i*) the topic clause introduces a set X containing all and only the individuals that satisfy both the restrictor and the nuclear scope property of the wh-indefinite, i.e. the set of tall girls –

this is due to the maximality (in a sense, λ-abstraction) contributed by the wh-indefinite; (*ii*) then, we check the comment clause relative to the set *X*, that is, we check that *X* is a singleton set – due to the singleton requirement contributed by the singular anaphor – and that the only girl in *X* is standing.

Note that we do not conflate Russellian definites (or universal quantifiers) and maximal indefinites: (*i*) definites maximize only over their restrictor property (the same thing happens with universal quantifiers), i.e. we extract the set of individuals satisfying the restrictor property, and check that this set is a singleton and that it satisfies the nuclear scope property; (*ii*) maximal indefinites maximize over both the restrictor and the nuclear scope property, i.e. we extract the set of individuals satisfying both of them, and we check that this set is non-empty. Thus, definites and maximal indefinites differ with respect to: (*i*) whether or not maximization 'includes' the nuclear scope property and (*ii*) whether or not the singleton requirement is part of their meaning.

The way we use maximal indefinites becomes clearer if we look at a related phenomenon in English, namely the uniqueness effects associated with singular cross-sentential anaphora. Consider (11) and (12) below – and "suppose I need to borrow a chair […] Leif has ten identical chairs, and he is willing to lend any of them. You can now say [(11)] to me […]. In this situation, the NP *a chair* does not refer to a unique chair. […] When anaphora is attempted, however, the uniqueness effect always shows up. Consider [(12)] in the same situation, and be sure that you are completely unable to distinguish any one of Leif's chairs from his other chairs. […] Many speakers cannot use [(12)] in such a situation […] [(12)] is only felicitous […] [if] they are referring to a chair which is uniquely identified by some property" (Kadmon 1990: 279-280).

(11) Leif has a chair. (Kadmon 1990)

(12) a. Leif has a chair. b. It is in the kitchen. (Kadmon 1990)

These uniqueness effects can be derived in terms of maximal indefinites as shown in (13) below (Kadmon 1990 proposes a different analysis): sentence (12a) introduces a set *X* consisting of all and only the individuals satisfying the restrictor and nuclear scope properties of the indefinite, i.e. the chairs that Leif brought; then, (12b) checks that *X* is a singleton (due to the singular anaphor) and that the only chair in *X* is in the kitchen[9].

[9]Ordinary and wh indefinites differ with respect to how their maximality comes about: maximality is always part of the semantics of wh indefinites, but only a (pragmatic) default for ordinary indefinites. This enables us to account for non-unique singular anaphora (unlike Kadmon 1990), e.g. *Leif memorized* a^{x} *poem and I memorized* $a^{x'}$ *different*$_{x}$ *one / an*$^{x'}$*other*$_{x}$ *one* (or: $a^{x'}$ *poem that was different from it*$_{x}$). This also enables us to account for (mixed) weak and strong donkey sentences, as Brasoveanu (2007) shows.

(13) Leif has a^X chair. It$_X$ is in the kitchen.

$\exists X[X \neq \varnothing \wedge \underbrace{X = \{y\text{: } chair(y) \wedge have(leif, y)\}}_{\text{maximality}} \wedge \underbrace{|X| = 1}_{\text{singleton}} \wedge in\_kitchen(X)]$

uniqueness

Thus, singular cross-sentential anaphora provides independent justification for the proposed analysis of uniqueness effects in correlatives.

2.2 The Universal / Non-Unique Interpretation

The universal / non-unique interpretation of Hindi correlatives basically arises by interposing a distributivity operator, contributed by the habitual morphology in the matrix clause, between (*i*) the maximal wh-indefinite in the subordinate clause and (*ii*) the singleton requirement contributed by the singular demonstrative in the matrix.[10]

(14)

jo^X laRkii lambii ho-tii hai, vo$_X$ khaRii ho-tii hai.
which girl tall be-hab.f be.prs, that one standing be-hab.f be.prs

$\exists X[X \neq \varnothing \wedge \underbrace{X = \{y\text{: } girl(y) \wedge tall(y)\}}_{\text{maximality}} \wedge \underbrace{\forall x \in X}_{\text{distributivity}} [\underbrace{|\{x\}| = 1}_{\text{singleton}} \wedge standing(\{x\})]]$

non-uniqueness

universal interpretation

The distributivity operator contributed by habitual morphology neutralizes the singleton requirement contributed by the singular anaphor. Therefore, the maximality of the wh-indefinite delivers the desired universal / non-unique interpretation.

But why would habitual morphology contribute a distributivity operator over individuals? In fact, it does not: I actually take habitual morphology to contribute *distributivity over cases / situations* – and only indirectly over the individuals featured in these cases / situations. Recall the informant's comment about the habitual correlative in (7): this correlative generalizes over situations in which there is a unique girl who is tall; about each such situation, we predicate that the girl in it stands.

[10] For simplicity, I take habitual morphology in the subordinate clause to be an agreement marker with a vacuous semantic value (e.g. an identity function of the appropriate type). Nothing crucial rests on this – the final version of the analysis allows for every occurence of the habitual morphology to be uniformly interpreted while still deriving the desired interpretation; see the appendix for the formal details.

The English discourses in (15) (Sells 1985) and (16) (Karttunen 1976) below exhibit a similar kind of distributivity, i.e. a similar kind of 'zooming in' on each case / situation under consideration: (15) says that, for each case / situation featuring a chess set and a spare pawn, the pawn in the case / situation under consideration is taped to the top of the box; and (16) says that, for each case / situation featuring a convention and a woman courted by Harvey at that convention, the woman in the case / situation under consideration comes to the banquet with Harvey.

(15) a. Every chess set comes with a^x spare pawn.
b. It$_x$ is taped to the top of the box.

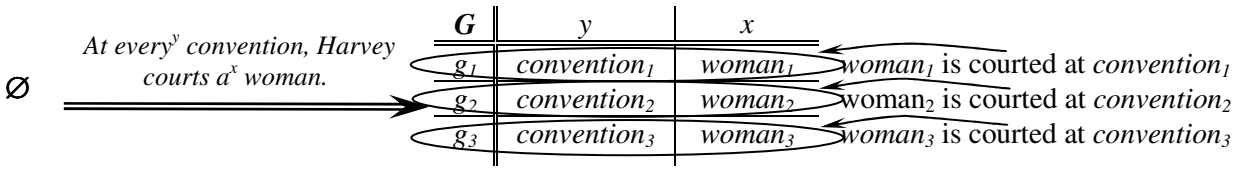
(16) a. Harvey courts a^x woman at every convention.
b. She$_x$ always comes to the banquet with him.

Thus, I propose that the distributivity contributed by Hindi habitual morphology is the same as the distributivity contributed by *always* in (16) – or covertly supplied in (15).

We also need to slightly revise our semantics for wh-indefinites: they do not introduce maximal sets of individuals, but maximal sets of cases / situations featuring all and only the individuals that satisfy their restrictor and nuclear scope.

So, how should we formalize this pre-theoretical notion of case? "[A] case may be regarded as the tuple of its participants; and these participants are values of the variables [i.e. anaphors] that occur free in the open sentence modified by the adverb [e.g. *always* in (16)]. In other words, we are taking the cases to be the admissible assignments of values to these variables" (Lewis 1975: 5-7). That is, a case is a sequence of individuals assigned as values to whatever variables / anaphors we have. Importantly, formalizing maximality requires us to manipulate *sets* of such cases / sequences – unlike Lewis (1975), which manipulates single cases.

For example, the set of cases contributed by sentence (16a) relative to the empty set of cases ∅ (on the narrow-scope reading of the indefinite *a woman*) is as shown below:



We store under the variable *y* all the conventions attended by Harvey and under *x* all the women courted by Harvey at the *y*-conventions. The cases / sequences encode the

dependencies between conventions and women in a distributive, pointwise manner: the woman in g_1 (namely $woman_1$) is courted at the convention in g_1 (i.e. at $convention_1$), the woman in g_2 is courted at the convention in g_2 etc. Then, sentence (16b), in particular the adverb *always*, instructs us to *distributively* test this set G of sequences: for each sequence, we check that the x-woman came to the banquet of the y-convention, e.g. for g_1, we check that $woman_1$ came to the banquet of $convention_1$ etc.

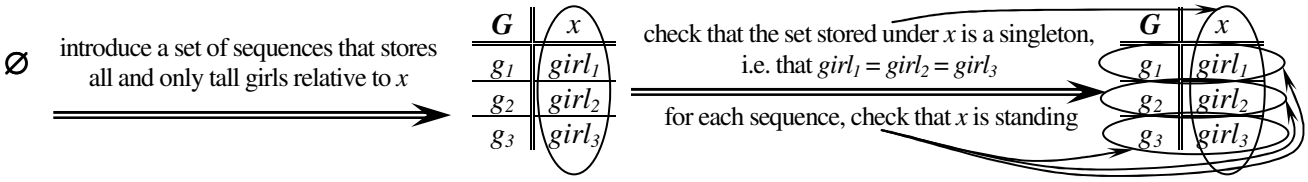
A compositional account of quantificational subordination along these lines (also, of donkey anaphora and modal subordination) is provided in Plural Compositional DRT (PCDRT; Brasoveanu 2007). I propose to use the same, independently motivated framework to account for the way in which correlatives are interpreted. The analysis, outlined in the following section, can be reformulated in situation-based terms if suitable adjustments are made, e.g. quantificational structures manipulate *sets* of (minimal) situations and pass them on across clausal boundaries.

2.3 Correlatives in Plural Compositional DRT (PCDRT)

The definite / unique single-topic correlative is analyzed as before, except that the tall girls are stored one at a time in a set of sequences and not lumped together in a single sequence storing the whole set – as shown in (17) below.

(17)

jo^x laRkii lambii hai,		vo$_x$ khaRii hai.
which girl tall be.prs,		that one standing be.prs
max^x($girl(x) \wedge tall(x)$)	$\wedge$	**singleton**(x) $\wedge$ $standing(x)$

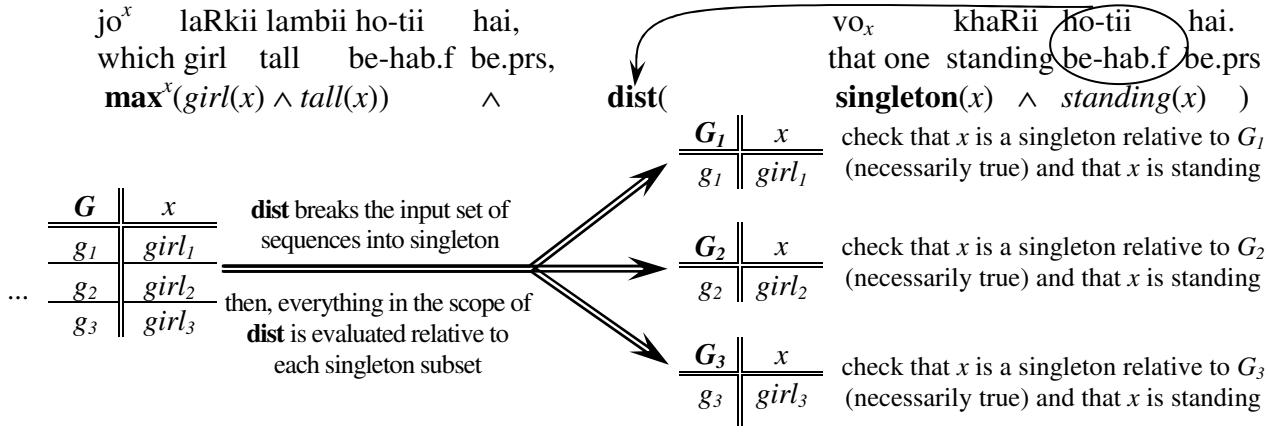


The **max**^{x} operator is dynamic λ-abstraction: (*i*) we extract the set of individuals satisfying the formula in the scope of the **max**^{x} operator (this is the static part), then (*ii*) we store it under x and pass it on to the next clause (this is the dynamic part).

The universal / non-unique single-topic correlative is also analyzed as before, except that habitual morphology distributes over the topical set G of sequences. As shown in (18) below, the topic clause receives the same interpretation as in (17) above. The comment clause, however, is differently interpreted due to the distributivity operator **dist** contributed by habitual morphology: the **dist** operator breaks the input set of

sequences $G=\{g_1, g_2, g_3\}$ into the singleton subsets $G_1=\{g_1\}$, $G_2=\{g_2\}$ and $G_3=\{g_3\}$ and requires the formula in its scope, i.e. the remainder of the comment clause, to be evaluated relative to each such singleton subset.

(18)



So, **dist** ensures the vacuous satisfaction / neutralization of the condition **singleton**(x): given that each set of sequences delivered by **dist** is a singleton, the set will store only one value for x. Hence, the **max**^{x} operator contributed by the wh-indefinite yields the desired universal / non-unique interpretation (see the appendix for more formal details).

To summarize, the variable uniqueness effects associated with correlative constructions emerge as a result of the interaction of three distinct components: (*i*) the *maximality over cases / situations* contributed by wh-indefinites, which update the context by introducing all the individuals that satisfy both their restrictor and their nuclear scope; (*ii*) the *singleton* requirement contributed by singular anaphors – this requirement applies to the set of cases / situations relative to which the anaphor is interpreted; (*iii*) the *granularity level* of the quantification denoted by the entire correlative construction – this granularity level is specified in Hindi by the presence vs. absence of habitual morphology.

In particular, the quantification can be *coarse-grained / episodic*, i.e. we 'collectively' quantify over the topical cases / situations introduced in the topic clause, which boils down to quantifying over topical individuals – and the comment clause is predicated of these individuals. This yields the definite / unique interpretation.

Alternatively, the quantification can be *fine-grained / habitual*, i.e. we 'distributively' quantify over the topical cases / situations introduced in the topic clause – and the comment clause is predicated of each case / situation. This yields the universal / non-unique interpretation.

3 Romanian Correlatives and the Pragmatics of Quantification

Romanian does not have habitual morphology. So, both unique and non-unique readings are available for single-topic correlatives – see (2) and (3) above. In contrast, habitual morphology is *available* in Hindi to express non-unique readings, so it *has to be used* to express such readings. This is an optimality-theoretic kind of reasoning: if a better candidate is *available* in a particular linguistic system – in our case, a candidate that pairs morphology and meaning more 'transparently', then this candidate *is* the grammatical one (unless there's an even better candidate); see Farkas & de Swart (2003) for a related proposal with respect to noun incorporation.

Thus, the proposal is that the availability of habitual morphology in Hindi forces single-topic correlatives without habitual morphology to have a definite / unique reading. In Romanian, both readings can be associated with the same morpho-syntactic structure because no such morphology is available.

Importantly, this is *not* to say that Romanian has *covert* habitual morphology of the kind overtly exhibited by Hindi – and that this morphology is covertly present whenever we have a universal reading. Such a hypothesis would be as implausible as the idea that English has covert morphology distinguishing between the inclusive and the exclusive (i.e. +/- addressee) 1st person plural pronoun *we* of the sort exhibited by a variety of languages (e.g. Kalihna, Chinook or Boumaa Fijian; see Harley & Ritter 2002). The 1st person singular pronoun *we* in English can have an inclusive or an exclusive *use*, i.e. this aspect of the interpretation of indexicals is part of pragmatics (and its interface with semantics). Similarly, which reading is available for a particular correlative in Romanian depends on pragmatic factors, e.g. the accidental / sporadic vs. non-accidental / habitual nature of the situations under consideration.

I propose that the interpretation of correlative (in general: quantificational) structures crucially involves a *granularity* level, i.e. a specification of the way in which the comment clause (in general: the nuclear scope) is predicated of the cases / situations characterized by the topic clause (in general: the restrictor). The granularity level of the quantification can be specified only pragmatically, as in Romanian, or there can be grammatical / semantic means to constrain its specification, as in Hindi. This situation is similar to the cross-linguistic variation with respect to the inclusive vs. exclusive specification for 1st person plural pronouns.

Independent evidence for the idea that the interpretation of quantificational structures involves a granularity level that is only pragmatically specified comes from English examples like (19) below.

(19) Four thousand ships passed through the lock last year. (Krifka 1990)

Sentence (19) "has two readings […] the *object-related* reading says that there are four thousand ships which passed through the lock last year […] the *event-related* reading says that there were four thousand events of passing through the lock by a ship last year. The [former] reading presupposes the existence of (at least) four thousand ships […]. In the [latter] reading, there might be fewer ships in the world" (Krifka 1990: 487).

The variation in ship individuation / counting is parallel to the way we interpret the **singleton** requirement contributed by singular anaphors in correlatives: the 'object-related', individual-based reading yields the definite interpretation, while the 'event-related', case/situation-based reading yields the universal interpretation.

Moreover, just as the granularity level of Romanian correlatives is dependent on pragmatic factors, the selection of a granularity level for examples like (19) is pragmatically constrained: "it is no accident that the best examples of [event-related readings] concern situations in which there are too many individuals to keep track of easily […]. It is much more difficult to get [such a] reading [for (19)] when only a small number of ships are involved. [For example, consider] the Chicago River–Lake Michigan sightseeing route, which we can assume is plied by just four sightseeing ships. It would be odd to say that *Four thousand sightseeing ships passed through the lock last year* even if each of the four ships did go through 1,000 times" (Barker 1999: 689-690).

This sensitivity to pragmatic factors, i.e. world knowledge, is left unexplained if we postulate two *covertly* different (object-related vs. event-related) denotations for the cardinal indefinite *four thousand* (as Barker 1999 observes)[11]. Similarly, the fact that the choice between a definite and a universal reading for Romanian correlatives is sensitive to pragmatic factors would be left unexplained if we postulated the existence of covert habitual morphology in Romanian.

I will conclude this discussion with the observation that analyzing single-topic correlatives (in both Hindi and Romanian) in terms of maximal sets of cases / situations – as opposed to maximal sets of individuals – is independently motivated by the interpretation of multiple-topic correlatives. In multiple-topic correlatives, we have anaphora to both *sets* of individuals and the *dependency* between them introduced in the topic clause. For example, the Hindi correlative in (4) introduces a set of girls and, for each girl, the boy she played against. Then, the comment clause elaborates on this "play against" relation – and not only on the 'bare', 'unstructured' sets of boys and girls: each girl defeated the boy she played against (and not some other boy that some other girl

[11]Geurts (2002) argues that a similar, pragmatically-determined granularity level is at work in donkey quantification.

played against). This is parallel to example (16): the "come to banquet" relation elaborates on the previously introduced "court at" relation between women and conventions – and not simply on the 'bare' sets of women and conventions[12].

Thus, if we have only maximal sets of individuals and distribute over such sets, there is no guarantee that the comment clause elaborates on the relation(s) between these sets mentioned in the topic clause. But if the topic clause introduces a maximal set of cases / situations, these cases / situations encode both sets of individuals and dependencies between them, so the comment clause can simultaneously elaborate on both.

4 Comparison with Previous Approaches

The semantics of Hindi correlatives is discussed in detail in Dayal (1996) (elaborating on Srivastav 1991 and Dayal 1995) and Bittner (2001).

Dayal (1995) examines habitual single-topic correlatives in Hindi and informally suggests that an account formulated in terms of (minimal) situations (Heim 1990 style) should be feasible. However, the formally explicit analysis in Dayal (1996) expressly rejects the idea – advanced in Andrews (1985) and further supported by both Bittner (2001) and the present account – that correlatives contribute quantificational structures of the same kind as donkey sentences: "correlatives and conditionals [like *If a farmer*

[12]The mixed universal & definite interpretation of multiple-topic Hindi correlatives can be captured by means of *selective* distributivity. Instead of unselectively (in the sense of Lewis 1975) distributing over cases / situations with the operator **dist**, we have a level of quantificational granularity that is intermediate between coarse-grained quantification over individuals and fine-grained quantification over cases. This is encoded by an operator $\mathbf{dist}_x$ (see Brasoveanu 2007 for its definition), which distributes over the cases featuring the values of the variable x contributed by the initial topic – hence the universal interpretation of x – but, for each value of x, the set of situations featuring that value are treated 'collectively' – hence the definite interpretation of all non-initial wh-topics in Hindi.

Why do we need to select this intermediate level of granularity in Hindi multiple-topic correlatives? I believe that this is due to a pragmatic (hence violable) constraint that requires topic-comment structures like correlatives to have *a single topic*. This constraint can be taken to follow from the Gricean maxim of manner: talk about only one thing, i.e. one topic, at a time. When we talk about only one individual, e.g. in single-topic correlatives with a definite interpretation, this constraint is satisfied. When we talk about situations that involve multiple topical individuals (introduced by multiple wh-indefinites), we satisfy this constraint if we take the *situations* featuring these individuals to be the one and only topic – and this is how we derive the fact that Romanian multiple-topic correlatives always have a universal interpretation.

In Hindi, however, fine-grained quantification, i.e. distributivity over cases, has to be encoded by habitual morphology, so episodic multiple-topic correlatives cannot receive a universal-across-the-board interpretation (as observed in Dayal 1995). On the other hand, having simultaneous multiple topics is pragmatically dispreferred. The compromise solution is to select an intermediate level of granularity that does not distribute over each case, but over sets of cases featuring the same value for the initial wh-topic. Given that this intermediate level of granularity is pragmatically selected, it is only a default – and we correctly predict that some speakers associate a *definite-across-the-board* interpretation with episodic multiple-topic correlatives in Hindi – a fact that is not noticed (or accounted for) in Dayal (1995, 1996).

owns a donkey, he beats it] encode fundamentally different dependencies" (Dayal 1996: 198). Two reasons are invoked for this claim. First, "in a correlative construction the number of wh expressions must match the number of demonstratives anaphoric to them. This, of course, is not true of conditionals" (Dayal 1996: 198), e.g. there is no pronoun co-referring with the indefinite *a donkey* in *If a farmer owns a donkey, he is happy*. Secondly, (the then available) static or dynamic approaches to donkey sentences fail to capture the definite vs. universal variation in interpretation exhibited by correlatives.

Dayal (1996) then proceeds to account for the range of interpretations that single and multiple topic correlatives have by postulating three different kinds of quantificational structures: (*i*) quantification over individuals for single-topic correlatives with a definite interpretation; (*ii*) quantification over (minimal) situations for single-topic correlatives with a universal interpretation; finally, (*iii*) quantification over suitable functions for multiple-topic episodic correlatives – for example, the quantification contributed by (4) above involves the function associating every girl with the one boy she played against.

The variation in quantification between individual and functional variables is attributed to an ambiguity in the interpretation of a covert [+wh] complementizer head that Dayal (1996) assumes to be present in subordinate / topic clauses: "I assume that C^0_{+wh} of a multiple wh relative clause denotes a set of relations [...] The whole sentence is true if the relation denoted by the main clause is included in this set [...] The wh expressions trigger this meaning but are otherwise interpreted as ordinary indefinites" (Dayal 1996: 200). Thus, the two different definite vs. universal quantificational 'forces' associated with single and multiple topic episodic correlatives are attributed to two suitable meanings for a wh-complementizer morpheme that is not realized in the surface structure. Furthermore, it is not clear how to integrate the quantification over individuals or functions contributed by this covert and ambiguous complementizer with the quantification over situations contributed by correlatives with habitual morphology.

Moving on to Bittner (2001), it is clear that the present account of Hindi single-topic episodic correlatives is a descendant of the dynamic analysis of correlatives proposed there (see in particular the discussion on pp. 52-53): both Bittner (2001) and the present analysis follow Andrews (1985) and treat the quantificational dependencies expressed by conditionals and correlatives in the same way.

Bittner (2001) captures Dayal's observation that correlatives – but not conditionals – have to anaphorically refer back to all the (wh) indefinites by means of an 'aboutness' presupposition associated with correlative structures (this proposal can be incorporated into the present account[13]). The 'aboutness' presupposition is due to the fact that wh-

[13]Ivan Sag (p.c.) suggests an alternative, syntactic account: assuming that correlatives involve wh-extraction from a coordination structure (Pollard & Sag 1994), the 'topic-comment matching' constraint follows from the fact that only across-the-board extraction is possible from coordination islands.

indefinites in correlatives are *topics*, which is not (always) true about ordinary indefinites in conditionals – and we cannot mark an indefinite as topical (by means of wh-morphology) and not comment about it: "the intuitive idea is that topic-comment sequencing presupposes that the comment is about the topic. [A correlative update] requires [...] every topical discourse referent introduced in the topic update [to] be picked up by an anaphoric demonstrative in the comment update" (Bittner 2001: 48).

There are two notable differences between Bittner (2001) and the present proposal. First, Bittner (2001) does not associated the maximality and singleton requirements with particular morphemes, but with a topical maximization operator that always occurs in correlative constructions and that takes scope over the entire subordinate / topic clause. Secondly, Bittner (2001) accounts only for the definite / unique interpretation of single-topic correlatives (see p. 54, fn. 7) and it is not clear how the account can be extended to capture universal / non-unique interpretations of single and multiple topic correlatives in Hindi and Romanian. This is, I take it, the force of the second objection mentioned above that Dayal (1996) raises against unified accounts of conditionals and correlatives.

The present account shows that this is only an objection against dynamic (or situation-based) approaches that update single cases / assignments, as classical DRT / FCS – and also Bittner (2001) – do. In contrast, systems like the one proposed in Brasoveanu (2007) (building on van den Berg 1996; see also Nouwen 2003), which update sets of cases / assignments, are well suited to provide a unified account of donkey conditionals and correlatives that derives their full range of cross-linguistically attested readings.

Appendix: Correlatives in Plural Compositional DRT (PCDRT)

Dynamic Ty2. Just as in Compositional DRT (CDRT; Muskens 1996), the underlying logic is Ty2 (Gallin 1975). There are three basic types: type t (truth-values); type e (individuals); type s (modeling DPL-style variable assignments). Constants of type e: *linus*, *maureen* etc. Variables of type e: x, x' etc. Variables of type s: i, j etc.

A discourse referent (dref) u for individuals is a function of type se from assignments i_s to individuals x_e (subscripts on terms indicate their type). Intuitively, $u_{se}i_s$ is the individual that the assignment i assigns to the dref u. Dynamic info states I, J etc. are plural: they are sets of variable assignments (as in van den Berg 1996), i.e. they are terms of type st. An individual dref u stores a set of individuals with respect to a plural info state I, abbreviated as $uI := \{u_{se}i_s\colon i_s \in I_{st}\}$, i.e. uI is the image of the set of assignments I under the function u. Thus, drefs are modeled like individual concepts in Montague semantics: just as an individual concept is a function from indices of evaluation to individuals, a dref is a discourse-relative individual concept, i.e. a function from discourse salience states (i.e., in PCDRT, variable assignments) to individuals.

Discourse Representation Structures. A sentence is interpreted as a Discourse Representation Structure (DRS), i.e. as a relation of type $(st)((st)t)$ between an input state I_{st} and an output state J_{st}. The output state J differs from I at most with respect to the new drefs and J satisfies all the conditions: [new drefs | conditions] := $\lambda I_{st}.\lambda J_{st}.\ I$[new drefs]$J \wedge$ conditions$J$, e.g. [u, u' | $girl\{u\}$, $boy\{u'\}$, $like\{u, u'\}$] := $\lambda I_{st}.\lambda J_{st}.\ I[u, u']J \wedge girl\{u\}J \wedge boy\{u'\}J \wedge like\{u, u'\}J$. Tests are DRSs that do not introduce new drefs: [conditions] := $\lambda I_{st}.\lambda J_{st}.\ I{=}J \wedge$ conditions$J$, e.g. [$like\{u, u'\}$] := $\lambda I_{st}.\lambda J_{st}.I{=}J \wedge like\{u, u'\}J$.

Conditions. Conditions, e.g. lexical relations like $like\{u, u'\}$, are sets of plural info states, i.e. they are terms of type $(st)t$. Lexical relations are *unselectively distributive* with respect to the plural info states they accept – they universally quantify over variable assignments: $R\{u_1, \ldots, u_n\} := \lambda I_{st}.\ I{\neq}\emptyset \wedge \forall i_s{\in}I(R(u_1 i, \ldots, u_n i))$, for any non-logical constant R of type $e^n t$ (where $e^n t$ is the smallest set of types such that (*i*) $e^0 t := t$ and (*ii*) $e^{m+1} t := e(e^m t)$). For example, $like\{u_1, u_2\} := \lambda I_{st}.\ I{\neq}\emptyset \wedge \forall i_s{\in}I(like(u_1 i,\ u_2 i))$.

Truth. A DRS D of type $(st)((st)t)$ is *true* with respect to an input state I_{st} iff $\exists J_{st}(DIJ)$.

Compositionality. Given the underlying type logic, compositionality at sub-clausal level follows automatically. In a Fregean / Montagovian framework, the compositional aspect of interpretation is largely determined by the types for the 'saturated' expressions, i.e. names and sentences. We abbreviate them as **e** and **t**. An extensional static logic is the simplest: **e** is e (individuals) and **t** is t (truth-values). The denotation of the noun `book` is of type **et**, i.e. et: `book` $\rightsquigarrow \lambda x_e.\ book_{et}(x)$. We go dynamic by making the 'meta-types' **e** and **t** finer-grained: **e** will be the type of drefs for individuals, i.e. se, and **t** will be the type of DRSs, i.e. $(st)((st)t)$. The denotation of the noun `book` is still of type **et**: `book` $\rightsquigarrow \lambda v_{\mathbf{e}}.\ [book\{v\}]$, i.e. `book` $\rightsquigarrow \lambda v_{\mathbf{e}}.\lambda I_{st}.\lambda J_{st}.\ I{=}J \wedge book\{v\}J$.

Singular anaphors: `vo`$_u$ / `aceea`$_u$ / `acela`$_u$ / `it`$_u$ $\rightsquigarrow \lambda P_{\mathbf{et}}.$ [**singleton**$\{u\}$]; $P(u)$,[14]

[14]I remain agnostic with respect to the exact source of the **singleton** condition contributed by singular anaphors. There are two obvious possibilities: the singleton requirement is due to either (*i*) the singular number morphology on the anaphor or (*ii*) the very anaphoricity of the singular pronoun / demonstrative.
The trade-off between the two options is as follows. If the **singleton** condition is attributed to anaphoricity, we expect plural anaphors to also contribute such a condition, which would enable us to account for the *maximality* effects associated with cross-sentential plural anaphora (noticed by Kadmon 1990) in a way that is parallel to the account of the uniqueness effects associated with singular anaphora in section **2.1** above. For example, we derive the observation that the discourse *Leif has four^{u} chairs. They$_u$ are in the kitchen* is felicitous only if Leif has exactly four chairs by taking: (*i*) the cardinal indefinite *four^{u} chairs* to introduce the (maximal) set of plural/sum individuals consisting of exactly four atoms, each atom being a chair that Leif has, and (*ii*) the plural anaphor *they$_u$* to require this set to be a singleton. That is, the PCDRT representation of the above discourse would be: (first sentence) **max**^{u}(**dist**([**4_atom**$\{u\}$, $chair\{u\}$, $have\{Leif, u\}$])); (second sentence) [**singleton**$\{u\}$, $in\_kitchen\{u\}$].

where **singleton**$\{u\}$:= $\lambda I_{st}.\ I\neq\emptyset \wedge \forall i_s\in I\forall i'_s\in I(ui=ui')$
and $D; D'$:= $\lambda I_{st}.\lambda J_{st}.\ \exists H_{st}(DIH \wedge D'HJ)$.

Indefinites: jo^u / $care^u$ / a^u $\rightsquigarrow$ $\lambda P_{\mathbf{et}}.\lambda P'_{\mathbf{et}}.$ $\mathbf{max}^u(\mathbf{dist}(P(u); P'(u)))$,
where $\mathbf{max}^u(D)$:= $\lambda I_{st}.\lambda J_{st}.\ ([u]; D)IJ \wedge \forall K_{st}(([u]; D)IK \rightarrow uK\subseteq uJ)$
and $\mathbf{dist}(D)$:= $\lambda I_{st}.\lambda J_{st}.\ \exists R_{s((st)t)}\neq\emptyset(I=\mathbf{Dom}(R) \wedge J=\cup\mathbf{Ran}(R) \wedge \forall<k_s,L_{st}>\in R(D\{k\}L))$
(where $\mathbf{Dom}(R)$:= $\{k_s: \exists L_{st}(RkL)\}$ and $\mathbf{Ran}(R)$:= $\{L_{st}: \exists k_s(RkL)\}$).

Habitual morphology: $hotii$ $\rightsquigarrow$ $\lambda D_{\mathbf{t}}.$ $\mathbf{dist}(D)$. Alternatively, we can have a VP modifier-like denotation: $hotii$ $\rightsquigarrow$ $\lambda P_{\mathbf{et}}.\lambda v_{\mathbf{e}}.$ $\mathbf{dist}(P(v))$.

Single-topic correlatives – definite / unique readings:
(TOPIC) $\mathbf{max}^u(\mathbf{dist}([girl\{u\}, tall\{u\}]))$; (COMMENT) [**singleton**$\{u\}$]; [$standing\{u\}$]
Single-topic correlatives – universal / non-unique readings:
(TOPIC) $\mathbf{max}^u(\mathbf{dist}([girl\{u\}, tall\{u\}]))$; (COMMENT) $\mathbf{dist}([\mathbf{singleton}\{u\}]; [standing\{u\}])$

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However, attributing the **singleton** condition to singular number morphology (plural anaphors would therefore not contribute such a condition) would enable us to account for the contrast between the interpretations of the following two discourses (the first discourse is from Karttunen 1976): *Harvey courts a^u woman at every convention.* {*She$_u$ is very pretty* vs. *They$_u$ are very pretty*}. The first sentence by itself is ambiguous between a wide-scope and a narrow-scope reading for the indefinite *a^u woman*. But the singular anaphor *she$_u$* in the second sentence allows only for the wide-scope reading, while the plural anaphor *they$_u$* allows only for the narrow-scope reading. This contrast can be captured if the singular anaphor, but not the plural one, contributes a **singleton** condition (as proposed in Brasoveanu 2007). I leave the quest for a unified analysis of all these phenomena for future research.

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Two Types of Definites: Evidence for Presupposition Cost*

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Abstract

This paper investigates the notion of definiteness from a psycholinguistic perspective and addresses Löbner's (1987) distinction between semantic and pragmatic definites. To this end inherently definite noun phrases, proper names, and indexicals are investigated as instances of (relatively) rigid designators (i.e. semantic definites) and contrasted with definite noun phrases and third person pronouns that are contingent on context to unambiguously determine their reference (i.e. pragmatic definites). Electrophysiological data provide support for this distinction and further substantiate the claim that proper names differ from definite descriptions. These findings suggest that certain expressions carry a feature of inherent definiteness, which facilitates their discourse integration (i.e. semantic definites), while others rely on the establishment of a relation with prior information, which results in processing cost.

1 Introduction

There has been a long and ongoing debate about the meaning of definiteness and following from this about a typology of definite expressions (cf. Russell 1905; Strawson 1950; Hawkins 1978; Prince 1981; Löbner 1985; and many others). Definite expressions include definite descriptions, demonstratives, pronouns, proper names, noun phrases (NPs) with a universal quantifier or a possessive as determiner, or generically used NPs, to name a few. Theoretical accounts have addressed on the one hand what kinds of properties are shared by these entities and on the other hand how

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these entities differ from one another. Researchers have for instance been arguing over whether proper names and definite descriptions share the same features (e.g. Russell 1905; Kneale 1962; Geurts 1997) or whether they are fundamentally different (e.g. Kripke 1972). Another issue is whether entities that refer to a unique referent that is common in all possible worlds – such as *the sky* – should be distinguished from entities that depend on contextual support for unambiguous reference – such as *the book* (Hawkins 1978; Löbner 1985). A lot of attention has also been paid to direct anaphors that refer to an entity already available in the discourse representation and to definite expressions that depend on accommodation, since in these latter cases, definiteness does not presuppose previous mention of a discourse referent (Lewis 1979; Heim 1982). In the following section, I provide a brief overview of a number of different theoretical accounts and then introduce Löbner's typology of definiteness, which is experimentally tested in subsequent sections.

2 Definiteness

2.1 A single notion of definiteness

The concept of definiteness has been characterized as a truth conditional semantic phenomenon, but also as a discourse-pragmatic phenomenon. Definiteness presupposes the existence of a referent, a notion that has for instance been discussed with reference to uniqueness, salience, or familiarity. In his classical account, Russell (1905) tied definiteness to the assertion of the uniqueness of the respective referent. Accordingly, a definite expression 'the X' refers to *one and only one* entity of the sort X. This approach was weakened by Christophersen (1939) who introduced the notion of non-ambiguity or intended uniqueness. As a consequence, definiteness is not restricted to sortal concepts and it implies that 'the X' stands for a *particular entity* (but not necessarily for the one and only one). Hence, while the Russellian account of uniqueness encounters difficulties with the presence of two entities of the same sort, this is circumvented by the idea of non-ambiguity. Strawson (1950) also emphasized the referential nature of definite expressions and argued that definiteness presupposes the existence of a referent. Theories that focused on the salience of an entity proposed that a definite expression refers to an entity that is *the most salient entity* in discourse representation satisfying the descriptive content (Lewis 1979; von Heusinger 1997). Within these frameworks, salience hierarchies must be employed and the definite determiner serves as a context-dependent choice function. Finally, in the tradition of the familiarity-based accounts, a definite expression refers to a particular entity *that is already available in the mental model* (Hawkins 1978; Heim 1982). An intricacy for this kind of approach are for instance expressions whose descriptive content suffices to identify a unique referent or the occurrence of indirect anaphors, i.e. definite expressions that are conceptually linked to information available in the discourse representation but that represent discourse-new referents.

What these theoretical traditions have in common is that they primarily focus on the presence of the definite determiner, which either implies uniqueness, non-ambiguity, familiarity, or discourse prominence. More importantly, all of these accounts are based on a single characterization of definiteness that targets unambiguous reference assignment.

2.2 A typological approach to definiteness

Another approach to definiteness is to abandon the idea that it represents a uniform property and to introduce different types of definites (Hawkins 1978; Löbner 1985) or to provide a graded account, as for instance reflected in accessibility scales or givenness hierarchies (Prince 1981; Ariel 1990; Gundel, Hedberg and Zacharski 1993; Aissen 2003).

The present paper focuses on Löbner's approach to definiteness, which proposes a two-way distinction between what he calls semantic and pragmatic definites. Semantic definites exist (relatively) independent of the particular situation of utterance, while pragmatic definites must be specified by information made available by the immediate situation for unambiguous reference (cf. also Hawkins 1978). Exemplars of semantic definites are proper names (e.g. *Hillary Clinton*) or inherently definite nouns (e.g. *the weather*), which have the same denotation in every possible world and thus refer unambiguously in and of themselves. Yet, indexicals (*I, you*) also belong to the class of semantic definites, since they have a limited referential scope and unambiguously identify their referents (speaker and hearer respectively) within a particular situation. The same reasoning considers indirect anaphors or expressions denoting inalienable possession as functional concepts that are clearly constrained by discourse or lexical information. In contrast, the majority of definite NPs (e.g. *the apple*), third person pronouns and demonstratives belong to the class of pragmatic definites, whose reference must be specified by contextual information that varies from situation to situation. Within this approach, definiteness is viewed as a functional concept that implies unambiguous reference, which is conditional on the situation of utterance in the case of pragmatic definites, but is established independently from the situation of utterance in the case of semantic definites.

3 Psycholinguistic considerations

To assess the validity of Löbner's account of definiteness, this paper presents an investigation of online sentence processing utilizing event-related brain potentials (ERPs). While participants read sentences, the electrical brain activity that occurs during this sensory and psychological event is recorded by means of electrodes placed on the participant's scalp, and the analysis of this activity (i.e. ERPs) makes it possible to compare the brain's reaction to specific linguistic events. ERP signatures are time-sensitive measures that can be characterized by their latency (with respect to the onset

of a stimulus), polarity (negative- or positive-going voltage deflection) and topography (maximum activity relative to scalp location).

On the basis of these characteristics, a negative-going potential peaking in amplitude around 400 ms after stimulus onset that shows a broad centro-parietal distribution – the so-called N400 – has been identified as an ERP signature relevant for semantic processing. Generally, the more demanding the interpretation and the more difficult the establishment of a dependency relation is, the more enhanced is the amplitude of the N400 signature. This has been demonstrated for lexical-semantic processing where the amplitude of the N400 is inversely related to the degree of plausibility and contextual coherence (for an overview see Kutas and Federmeier 2000 or Kutas, Van Petten and Kluender 2006). The amplitude of the N400 has proven to be sensitive to fine-grained semantic distinctions, such as the number of semantic features that are shared by a contextually expected word (*palms*) and a presented word (e.g. *They wanted to make the hotel look more like a tropical resort. So along the driveway they planted rows of palms/pines/tulips.* (from Federmeier and Kutas 1999). Moreover, N400-differences are observable during referential processing where pronominal interpretation elicits an enhanced N400-like component when contrasted with the comprehension of proper names (Streb, Rösler and Hennighausen 1999; Burkhardt 2005). In addition, the amplitude of the N400 is a function of the difficulty of dependency formation and reflects the type of referential relation, with increasing amplitudes in the order of coreference relation, accommodation, and absence of a discourse relation (Burkhardt 2006; Burkhardt and Roehm 2007b). These findings have also been discussed with reference to the givenness status of a discourse referent, such that the less given an entity is, the more pronounced is the amplitude of the N400.

With respect to the current research objective, these findings suggest that if a distinction exists between semantic definites (that have a relatively fixed reference) and pragmatic definites (that depend on discourse representation for reference specification and are therefore less given), the latter should evoke increased processing demands during reference assignment.

4 ERP evidence for semantic vs. pragmatic definites

Three pairs of semantic definites (henceforth SDs) and pragmatic definites (PDs) were contrasted in the present investigation to test the validity of this two-way characterization of definiteness: inherently definite NPs vs. context-dependent definite NPs (see 4.2 below), proper names vs. context-dependent definite NPs (4.3), and first person indexicals vs. third person personal pronouns (4.4). Based on previous ERP findings, the predictions for all three contrasts – independent of the particular properties of the respective NPs – were that the more demanding referent selection and identification that is hypothesized to be required for the interpretation of pragmatic definites should be reflected in a more enhanced N400-amplitude.

4.1 Experimental design

4.1.1 Participants

Twenty-one students (10 male; mean age: 22.8 years) from the University of Marburg participated in these investigations. All participants were native speakers of German, right-handed, and reported normal or corrected-to-normal visual acuity.

4.1.2 Procedure

Participants were seated comfortably in front of a computer monitor and were instructed to read sentences for comprehension. Experimental stimuli were presented visually in the center of the computer screen in yellow letters against a blue background and in a segmented manner (definites phrase-wise and all other elements word by word) for 450 ms each and with an inter-stimulus interval of 150 ms. Following the presentation of an experimental sentence, participants had to perform a word recognition task to a visually presented word. 'Yes' and 'no' responses were equally distributed across all items. This task was employed to assure that participants were paying attention to the sentences. Each session started with two brief practice blocks. The experimental session, which consisted of 320 pseudo-randomized stimuli, was carried out in eight blocks with short breaks between blocks.

The electroencephalogram was recorded from 24 Ag/AgCl scalp electrodes mounted in an elastic cap (*EasyCap*). The ground electrode was placed at position C2 (cf. Jasper 1958). Recordings were referenced to the left mastoid and rereferenced offline to linked mastoids. In order to control for artifacts resulting from ocular movements, vertical and horizontal eye movements were monitored by means of two sets of electrode pairs, placed above and below the participant's left eye and at the outer canthus of each eye. Electrode impedances were kept below 5 kΩ. All channels were amplified with a *BrainVision Brain-Amp* amplifier and recorded with a digitization rate of 250 Hz.

Average ERPs were time-locked to the onset of the critical definite entity (marked in bold in the example sentences below) and computed per condition per participant, before grand averages were calculated over all participants. Trials that registered an incorrect or timed-out response (i.e. 2000 ms after presentation of recognition probe) or that contained ocular, amplifier-saturation, or other artifacts were excluded from averaging. For the statistical analysis of the ERP data, repeated measures analysis of variance (ANOVA) was performed with the factor DEFINITENESS (SD/PD). The following electrode positions entered the statistical analysis: F3, F4, F7, F8, FZ, FC5, FC6, FCZ, FT7, FT8, C3, C4, CZ, CP5, CP6, CPZ, P3, P4, P7, P8. All statistical analyses are based on the mean amplitude value per condition in a time-window between 400-600 ms.

4.2 Inherently definite NPs as SDs

First, inherently definite NPs were considered as SDs and contrasted with definite NPs that are dependent on contextual information for unambiguous reference (PDs). Inherently definite NPs are NPs that refer to concepts that are common to all situations such as *the weather, the time,* or *the presence* and are considered rigid designators. Contrary to this, NPs such as *the product, the clock,* or *the strategy* must be specified by the situation of utterance to clearly identify the respective referent.

4.2.1 Materials

Forty pairs of inherently definite NPs and context-dependent definite NPs were selected that were matched for length and frequency of occurrence. The following diagnostics were used to identify inherently definite NPs: i. these SDs do not take an indefinite determiner; ii. they do not allow plural forms; and iii. they cannot be used as sortal concepts. Finally, all NPs were embedded in sentences as exemplified in (1a) for inherently definite NPs as SDs and (1b) for context-dependent NPs as PDs.

(1a) Ich finde, dass **die Zeit** immer wieder sehr schnell vergeht.
I think that **the time** always again very quickly Passes
'I think that **the time** passes very quickly over and over again.'

(1b) Ich finde, dass **die Uhr** immer wieder richtig nervig tickt.
I think that **the clock** always again truly annoying ticks
'I think that **the clock** ticks truly annoyingly over and over again.'

4.2.2 Results

Figure 1 presents the grand average ERPs for inherently definite NPs (red line) and context-dependent definite NPs (blue line) at three selected central electrode sites, whose positions on the scalp are depicted on the graph in the lower right corner. The ANOVA revealed a main effect of DEFINITENESS between 400-600 ms after the onset of the critical entity [$F(1,20)=11.53$, $p<.01$], which is reflected in a more enhanced negativity for context-dependent PDs over inherently definite NPs. (Note that ERP effects reflect the *relative difference* between the waveforms of two critical conditions.) This N400 effect for PDs supports the hypothesis that the integration of definites that depend on contextual information to determine unambiguous reference is subject to increased processing cost.

Figure 1. Inherently definite NPs vs. Context–dependent definite NPs

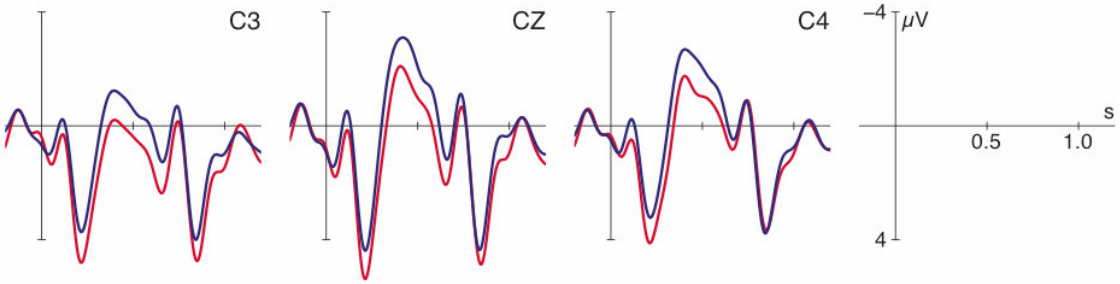
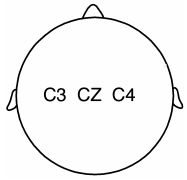


Figure 1 presents grand-average ERPs for the two conditions at three selected central electrode sites: C3 (left), CZ (midline) and C4 (right). Time-window spans from 200 ms before the onset of the critical definite expression (which starts at the vertical bar at 0 ms) until 1200 ms after. Negative voltage is plotted upwards.



4.3 Proper names as SDs

Proper names served as a second test case of the SD-PD distinction. However, their status is discussed controversially in the literature. Some accounts of proper names view them as rigid designators, which represent constant functional concepts and lack descriptional content (Kripke 1972; Löbner 1985), or as indexicals, whose content is conventionally assigned within a particular speaker-hearer interaction (Pelczar and Rainsbury 1998). Accordingly, they are considered inherently definite concepts, which may be supported by the observation that proper names typically cannot be modified by a restrictive relative clause. As a consequence, proper names should differ from context-dependent NPs along the SD-PD divide and should thus show similar electrophysiological properties as the inherently definite NPs discussed in 4.2 above. Contrary to this view, there are accounts that describe proper names as definite description of the sort 'the individual named X', i.e. proper names are considered to denote and describe (Frege 1892; Russell 1905; Kneale 1962; Geurts 1997). Under this approach, proper names carry descriptional content and do not differ from other definite NPs. Hence no electrophysiological difference is predicted to emerge between proper names and context-dependent definite NPs. In addition to the main objective addressing a possible difference between SDs and PDs, the present comparison can thus also shed light on the particular status of proper names.

4.3.1 Materials

Forty sentences containing length and frequency matched pairs of proper names (2a) and definite descriptions (PDs as illustrated in (2b)) were constructed. To make these two instantiations of definiteness more comparable, proper names were presented with a definite determiner (which is possible in German, albeit more often in colloquial speech). This decision is further warranted by an additional comparison with control

sentences that contained proper names without a definite determiner, which yielded no ERP differences.

(2a) Ich finde, dass **der Rolf** doch meistens extrem albern tanzt.
I think that **the Rolf** afterall mostly extremely ludicrous dances
'I think that **(the) Rolf** dances in an extremely ludicrous manner most of the time.'

(2b) Ich finde, dass **der Fluss** doch meistens äußerst trübe aussieht.
I think that **the river** afterall mostly extremely turbid looks
'I think that **the river** looks extremely turbid most of the time.'

4.3.2 Results

The grand average ERPs for proper names (red) and context-dependent definite NPs (blue) are depicted in Figure 2. Context-dependent definite NPs show a more pronounced negative deflection relative to proper names. This differences was confirmed by statistical analysis, which registered a main effect of DEFINITENESS in the time-window from 400 to 600 ms post-onset [$F(1,20)=4.91$, $p<.04$]. In analogy to the findings from section 4.2, the observed N400 reflects increased processing demands exerted during the interpretation of context-dependent NPs. Crucially, proper names differ from definite descriptions – and appear to pattern with inherently definite NPs. This suggests that proper names are less dependent on contextual support, substantiating accounts that advocate a lack of descriptional content and that dissociate proper names from other definite expressions (e.g. Kripke 1972; Löbner 1985).

Figure 2. Proper names vs. Context–dependent definite NPs

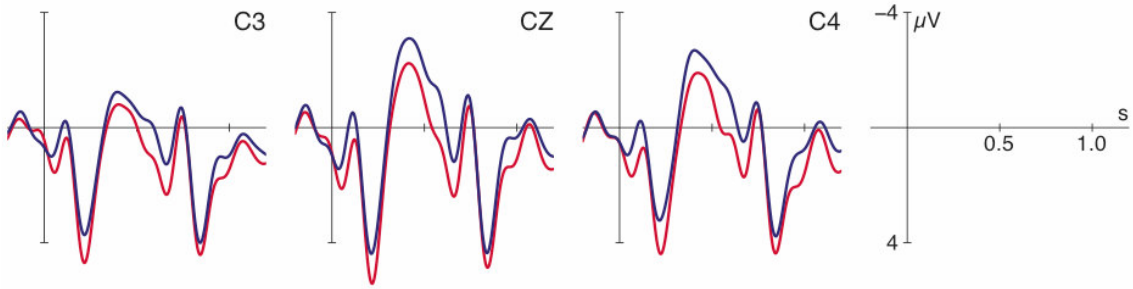


Figure 2 presents grand-average ERPs for proper names (red) and context-dependent NPs (blue) at three selected central electrode sites. The time course is plotted horizontally and spans from 200 ms before until 1200 ms after the onset of the critical expression. Negativity is plotted upwards.

4.4 Indexicals as SDs

The results from the previous two investigations propose that definiteness comes in different flavors as implied by the SD-PD distinction. The final comparison explores whether these findings can be extended to other forms of definite expressions such as pronouns. According to Löbner, pronouns also fall within this semantic-pragmatic distinction, such that indexicals refer to the key participants in a communicative act (i.e. speaker, addressee), while third person pronouns refer to discourse referents that vary to a much greater extent. Indexicals thus carry inherent content and refer in a relatively rigid manner (*I=speaker, you=addressee*), although the actual assignment of speaker/addressee reference varies. Indexicals are thus categorized as SDs. Contrary to this, third person pronouns are less restricted in the selection of their referents and change their reference as a function of context (*she=the singer, my colleague, Barbara,…*). They thus are representations of PDs.

4.4.1 Material

Eighty sentences including either a first person pronoun (3a) or a third person feminine pronoun (3b) were created. In order to make the third person pronouns comparable to the context-dependent NPs discussed above, the sentences did not make available a gender-matching antecedent for the pronoun, pointing towards an extra-sentential referent.

(3a) Emily betont, dass Der Lehrling, den **ich** herzte, gezündelt hat.
Emily emphasizes that The apprentice whom **I** hugged kindled has
'Emily emphasizes that the apprentice whom **I** hugged had kindled.'

(3b) Knut berichtet, dass der Dichter, den **sie** herzte, gelächelt hat.
Knut reports that the poet whom **she** hugged smiled has
'Knut reports that the poet whom **she** hugged had smiled.'

4.4.2 Results

Figure 3 illustrates the grand average ERPs for the first person indexicals (red line) compared to the context-dependent third person pronouns (blue line). The latter show a more pronounced negativity between 400-600 ms relative to the onset of the pronoun. This effect was supported by statistical analysis with a main effect of DEFINITENESS [$F(1,20)=4.41$, $p<.05$]. Together with the findings from full NPs presented in 4.2 and 4.3, this result indicates that irrespective of the form of a definite expression, those expressions that rely on contextual enrichment (PDs) consume more processing resources.

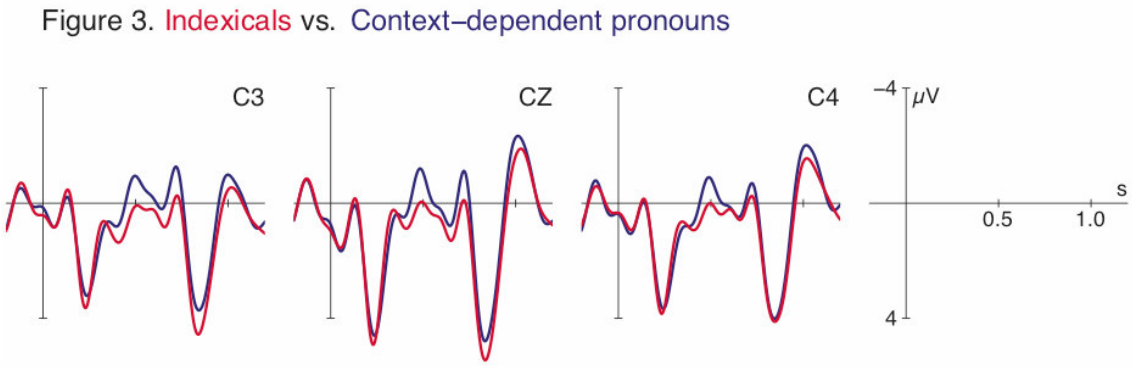


Figure 3 presents grand-average ERPs for first (red) and third person personal pronouns (blue) at three selected central electrodes. The time window spans from 200 ms before to 1200 ms after the onset of the critical pronoun (onset at vertical bar). Negative voltage is plotted upwards.

5 Discussion

This paper examined the notion of definiteness by looking at the online processing of different linguistic expressions, i.e. NPs with a definite determiner, proper names, and pronouns. In spite of their differences in form and function, the electrophysiological results indicate that the distinction between semantic and pragmatic definites as formulated in Löbner (1985) has a bearing on referential processing and should therefore be incorporated in a theory of definiteness. In general, the interpretation of expressions that depend on context-specific information for unambiguous reference exerts processing cost – reflected in a more pronounced N400 signature – while the comprehension of rigid designators is less computationally demanding. This is in line with previous electrophysiological findings that report that the more difficult the formation of a referential dependency is, the more pronounced is the N400-amplitude.

In particular, the first comparison revealed that the inherent definiteness of nouns such as *the weather* or *the future* can be distinguished from context-dependent nouns such as *the cloud* or *the bird.* The second comparison indicated that proper names pattern with inherently definite NPs and differ from definite descriptions (contra Kneale 1962; Geurts 1997; and others). Overall, these two sets of data substantiate the dissociation between semantic definites that are rigid designators and receive referential meaning through intrinsic lexical properties and pragmatic definites that require rich contextual support for unambiguous reference assignment. The third contrast showed that this distinction also holds for pronominal entities, where indexicals that are characterized by a highly constrained reference set represent exemplars of semantic definites, while third person pronouns typify pragmatic definites. In the following, I first discuss the implications of these findings for an account of definiteness. Then I comment on the status of proper names within such a theory.

5.1 Definiteness

The current data demonstrate that the concept of definiteness is not restricted to the occurrence of the definite determiner and that definiteness goes beyond morpho-syntactic encoding. This is supported by the findings from pronouns (4.4), as well as the observation that the presence or absence of a definite determiner has no significant impact on the interpretation of proper names (4.3). Rather, definiteness is a semantic feature associated with a lexical entry that affects the establishment of reference. In the case of semantic definites, definiteness is an inherent property of a noun that must be used as a functional concept. This however renders the occurrence of the definite determiner redundant (at most in the case of inherently definite nouns), but it explains its optionality with respect to other expressions such as names, as well as its absence in certain languages. In the case of pragmatic definites, definiteness is directly conveyed by the definite determiner, which forms a link with its complement and specifies that the head noun should be used as a functional concept (cf. Löbner 1985).

Definite expressions as functional concepts thus identify a referent via a certain dependency relation R between an expression and an entity in the discourse representation. For pragmatic definites, this dependency is constrained by specific discourse-pragmatic information; for semantic definites, the relation must only be linked to a "situation file card" (Heim 1982) or a "situational argument" (Löbner 1985) that relates constant functional concepts to the actual situation of utterance (e.g. *the weather today; I = Ann*). In other words, the existence of semantic definites is presupposed due to their inherently rigid designation in every possible discourse, while pragmatic definites require particular reference specification in a given discourse. To satisfy the presupposition of existence, pragmatic definites must search the discourse representation for a proper referent, while semantic definites do not require such a selectional operation and must only be linked to a situation file card. These differences in the establishment of a referential relation are reflected in distinct processing patterns.

An alternative interpretation of the electrophysiological data could be related to the given-new distinction: discourse-new entities have been reported to elicit a more enhanced N400 when contrasted with previously introduced, given entities (Burkhardt 2006). Since all pragmatic definites that were used in the current investigation were discourse-new, while the semantic definites by definition represent inherently given concepts, the observed difference could also be interpreted with respect to the given-new divide, rendering the semantic-pragmatic dissociation an epiphenomenon of the given-new contrast. However, if this were the case, the inherent property of rigid designation shared by the semantic definites would still have to be encoded in the lexical entry to mark their givenness. In addition, the following observations suggest that the semantic-pragmatic distinction represents a valid property that reaches beyond mere givenness. First of all, there are a number of diagnostics for the distinction between semantic and pragmatic definites, targeting so-called definiteness effects in *there*-constructions, cliticization, phonological differences, or the tests mentioned in

4.2.1 above (cf. Löbner 1985; Lyons 1999). Second, additional evidence from Burkhardt and Roehm (2007a) indicates that the difference between definite descriptions and proper names persists independent from the givenness status of the respective expressions: an enhanced N400 was observed for definite descriptions (PDs) over proper names (SDs) representing both new *and* given information. This is an important observation because it suggests that the distinction between these two types of definite expressions is first and foremost semantic in nature – and not primarily guided by the information structural distinction between given and new.[1] Furthermore, it implies that this distinction is more fundamental than intended in Löbner's framework, which explicitly discusses previously introduced, direct anaphors as pragmatic definites.

While most accounts of definiteness mentioned in section 2.1 encounter difficulties with indirect anaphors, inherently definite NPs, proper names, or definite expressions who fail to meet the uniqueness requirement, such as *the mayor of a small town in Bavaria*[2] – which all belong to the class of semantic definites – the two-way distinction offers a sound explanation that manages to take account of these different entities. Overall, the present findings strengthen the relevance of the semantic-pragmatic distinction for a theory of definiteness. This distinction could be expressed through a feature [±DEF], which is specified in the lexical entry of inherently definite entities (thus confining the referential space radically) and the determiner or third person pronoun for pragmatic definites.

5.2 Proper names revisited

The investigation of proper names in section 4.3 further revealed processing differences between proper names and definite descriptions. Proper names registered a processing advantage, reflected in a less pronounced negative deflection, which is a finding that corroborates accounts that regard proper names as rigid designators (e.g. Kripke 1972). The electrophysiological data thus provide a novel piece of evidence for the ongoing debate over the nature of proper names (see also the findings mentioned above from Burkhardt and Roehm 2007a).

This said, proper names may also be a good means to investigate whether the semantic-pragmatic distinction is in fact a two-way contrast associated with a feature [±DEF] or whether it represents a continuum ranging from complete inherent definiteness to full

[1] Another finding that supports this view has been presented in Streb et al. (1999) and Burkhardt (2005) albeit with a different interpretation. Streb et al. (1999) reported an N400 effect for third person pronouns compared to proper names (both given entities, since the respective referents were introduced in a context sentence), while Burkhardt (2005) reported an N400 for previously introduced third person pronouns compared to discourse-new proper names. Assuming that the present generalization is valid, this effect can be reinterpreted as tapping the difference between proper names as semantic definites and third person pronouns as pragmatic definites.

[2] According to Löbner, the definite article determines the definiteness of the head noun *mayor*, but not that of the entire noun phrase.

context dependence (cf. e.g. the definiteness scales in Aissen 2003, but also Ariel 1990). The notion of inherent definiteness should by no means be regarded as a firm concept. This is clearly the case for the indexicals, which change their real world referent in different situations of utterance. The same is also true for proper names, which may have different denotations (e.g. *Hillary* refers to *Hillary Miller* in one case and to *Hillary Fisher* in another). In contrast, *Hillary Clinton* is unambiguously associated with a constant referent. Whether these different degrees of rigidity impact the conception of inherent definiteness remains subject for future research.

6 Conclusion

The present data provide experimental support for a typology of definite expressions along the semantic-pragmatic divide. They demonstrate that definiteness is not exclusively tied to the occurrence of the definite determiner, but represents a more general functional concept that applies at the semantics-discourse interface. In principle, definiteness introduces the presupposition that a relation should be established with a particular entity in discourse representation and this relation is contingent on the respective type of definite expression. Semantic definites possibly carry a feature of inherent definiteness in their lexical entry [+DEF], which facilitates their discourse integration. Pragmatic definites, in contrast, must enter into a discourse relation with previously mentioned referents, which is triggered by the definiteness feature on the definite determiner, demonstrative, or pronoun, and results in processing cost.

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Projecting Presuppositions with Scalar Implicatures *

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Abstract

I present a system which reconciles free choice permission effect with other scalar implicatures. The core idea is to cluster together alternatives which are obtained by similar transformations of the original sentence (e.g., replacement of a given item with a stronger item). Interestingly, this system can be extended to account for presupposition projection.

1 Introduction

The sentence in (1) is a standard example of free choice permission (see Kamp, 1973):

(1) John may eat an apple or a banana.

(2) a. John may eat an apple.
b. John may eat a banana.

The sentence contains a disjunction in the scope of an existential modal, and yet it is interpreted as the conjunction of the modal statements in (2): John may eat an apple and John may eat a banana. Kratzer (2002) (followed by, e.g., Alonso-Ovalle, 2005) argued that these inferences should be analyzed as scalar implicatures.

Scalar implicatures are inferences arising from the comparison between a sentence and its potential alternatives. For instance, one could argue that the words *some* and *all* are in competition – they belong to a common *scale* of items: ⟨ some, all ⟩ – so that sentence (3) raises the alternative in (3-a). This alternative is stronger than the original sentence (3), and so it would have been more "efficient" to utter it instead of (3). One may thus conclude that the speaker did not utter it because s/he does not believe that this alternative is true in the first place, hence the scalar implicature reported in (3-b).

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(3) John read some of the books.
   a. Alternative: John read all the books.
   b. Scalar implicature: $\neg B_s[$ John read all the books. $]$

Consider example (1) again. It is important for most theories of scalar implicatures that (2-a) and (2-b) are alternatives to sentence (1). Since these alternatives are logically stronger than the sentence itself, just as (3-a) is stronger than (3), we should infer that the speaker does not believe that these alternatives are true, contrary to the original intuition.

This puzzle has motivated various departures from the usual implementations of the Gricean understanding of scalar implicatures which was sketched above (Grice, 1967): see, e.g., Fox (2006), Klinedinst (2006) and Schulz (2003). In this paper, I present a new proposal which has the additional virtue to make surprisingly accurate predictions for presupposition projection.

2 Proposal

On a traditional account of scalar implicatures, an alternative generates a scalar implicature on the basis of its overall relation with the sentence it is an alternative of. For instance, the scalar implicature (3-b) arises because the alternative (3-a) is stronger than the original sentence (3). In other words, alternatives crucially differ in that they are stronger or weaker than the original sentence.

On the present account, the status given to an alternative is directly tight to the type of transformation needed to produce this alternative. Roughly, alternatives crucially differ in that they are obtained via the replacement of an item by a stronger or a weaker scale-mate. This leads to the following principle:

(4) Similarity Principle: The speaker should be in a similar epistemic attitude towards alternatives obtained via the same type of transformations.

What transformations are of the same type? What does it mean to be in a similar epistemic attitude towards various alternatives? The next section provides a first illustration of these notions at work.

2.1 First illustration

Consider sentence (5).

(5) John ate an apple or a banana.

Several types of transformations can be applied to this sentence to obtain alternatives. First, one may transform the sentence by keeping only one of the two disjuncts, leading to the following two alternatives:

(6) a. John ate an apple.
b. John ate a banana.

The similarity principle (4) requires that the speaker have a similar epistemic attitude towards these two sentences. The intended meaning is that if the speaker believes one of the two alternatives, s/he ought to believe the other one as well. This can be implemented as follows: $B_s[\,(6\text{-a})\,] \longleftrightarrow B_s[\,(6\text{-b})\,]$. This reflects the following intuition: if the speaker believes that John ate an apple and does not believe that John ate a banana, the sentence is infelicitous, even though it is true.

Another transformation that can be applied to sentence (5) is the replacement of the item *or* with its stronger scale-mate *and*, leading to the following alternative:

(7) John ate an apple and a banana.

This is a replacement of an item with a stronger item. To implement the effect of such a transformation, the sentence will be clustered with the alternative in (8), where $\otimes_\perp$ stands for a super strong connective which yields a contradiction at the first site of the appropriate type.

(8) John ate an apple $\otimes_\perp$ a banana.

Applying the similarity principle to this new cluster of alternatives – (7) and (8) are obtained by the same type of transformations: replacements of *or* with stronger items – we obtain the following inference: $B_s[\,(7)\,] \longleftrightarrow B_s[\,(8)\,]$. Since (8) is contradictory, this simply says that $\neg B_s[\,(7)\,]$. This inference corresponds to the exclusive reading of the disjunction: it is not the case that the speaker believes that John ate both an apple and a banana.

In fact, we only derived a primary implicature, it needs to be enriched into a secondary implicature: $B_s[\,\neg(7)\,]$, the speaker believes that John did not eat both fruits (see Soames, 1982; Horn, 1989). To achieve this enrichment, one could follow previous proposals and recruit a contextual "competence assumption" (see Spector, 2003, van Rooij, 2004 and specially Sauerland, 2004 for the version which would be most immediately applicable in the present framework).

I would like to propose a very similar kind of enrichment except that it fits better with the present technical framework. The standard epistemic step relies on the following intuition: unless there is reason to think otherwise, if a speaker does not believe that X is true (i.e. $\neg B_s[\,X\,]$), it is likely to be because s/he believes that X is false (i.e. $B_s[\,\neg X\,]$). The parallel idea I propose to adopt is that if a speaker has a similar attitude towards

X and Y (i.e. $B_s[X] \longleftrightarrow B_s[Y]$), it is likely to be because s/he believes that X and Y have the same truth-value (i.e. $B_s[X \longleftrightarrow Y]$).

As a result, the above inference that $B_s[(7)] \longleftrightarrow B_s[(8)]$ would be enriched into $B_s[(7) \longleftrightarrow (8)]$ which states that the speaker believes that (7) is false (because (8) is contradictory).

One might wonder why we could not apply the same enrichment to the inference obtained from the cluster of alternatives in (6). We would obtain that $B_s[$(6-a) $\longleftrightarrow$ (6-b)$]$: the speaker believes that John ate both fruits or none of them. Given that s/he said (5), we would then infer that the speaker believes that John ate both fruits. This inference is incompatible with the *primary* inference derives from the other cluster of alternatives (i.e. $B_s[\neg$John ate both fruits$]$). The enrichment is thus naturally blocked for this first cluster of alternatives in a fully standard way: secondary implicatures are blocked because they are incompatible with other primary implicatures, see Sauerland (2004).

2.2 Roadmap to derive scalar implicatures

Various transformations may be applied to derive the alternatives to a given sentence. Some of these transformations are similar: replacements of a given scalar item with various weaker scale-mates, replacements of a given scalar item with various stronger scale-mates, or replacements of a connected phrase with one or the other of the two connected phrases. The Similarity principle (4) requires that similar transformations yield e-similar alternatives, i.e. alternatives which have the same status in the speaker's mind: $B_s[X] \longleftrightarrow B_s[Y]$. Any of these relatively weak inferences may be enriched into $B_s[X \longleftrightarrow Y]$ if the result is consistent with all the weak inferences.

The three main steps of the derivation are given below:

Step 1: similar transformations and sets of alternatives

Identify first the types of transformations which apply to the sentence S. There are two sources of transformations (scalar items and connective phrases that can be split) and three types of transformations:

(9) Three types of transformations

a. Stronger replacements (from a scale). (e.g., {or → and}, {or → $\otimes_\bot$})

b. Weaker replacements (from a scale). (e.g., {and → or}, {and → $\otimes_\top$})

c. Each connective can be split in two. (technically: $\{A \otimes B \rightarrow A\}$, $\{A \otimes B \rightarrow B\}$)

Each set of transformations of the same type produces a cluster of alternatives.

(10) Clusters of alternatives:

a. $\{ X_1 , X_2 \}$,

b. $\{ Y_1 , Y_2 \}$, ...

Step 2: primary inferences

After the alternatives have been clustered, the similarity principle can be applied: it requires that the speaker is in a similar epistemic attitude towards each alternative from a given set:

(11) Primary similarity inferences:
a. $B_s[\ X_1\ ] \longleftrightarrow B_s[\ X_2\ ]$,
b. $B_s[\ Y_1\ ] \longleftrightarrow B_s[\ Y_2\ ]$, ...

Step 3: secondary inferences

The last step is to enrich the previous inferences: Strengthen each of the inferences above that can be strengthened consistently with all of these inferences (and consistently with the assertion itself as well):

(12) (Potential) secondary similarity inferences:
a. $B_s[\ X_1 \longleftrightarrow X_2\ ]$ is compatible with the inferences in (11),
b. $*B_s[\ Y_1 \longleftrightarrow Y_2\ ]$ is blocked because incompatible with (11), ...

2.3 Summary of the proposal

I presented in this section a new framework to treat alternatives and derive scalar implicatures. The core idea is to cluster alternatives on the basis of the transformations needed to derive them as alternatives in the first place. The motivations for this framework come from its empirical coverage.

3 Applications

In this section, I review a few examples which show the proposal at work.

3.1 Usual scalar implicatures

3.1.1 Bare disjunction

Example (5) repeated below already showed the predictions of the present proposal for a bare disjunctive sentence:

(13) John ate an apple or a banana.
(14) Predicted inferences:
a. $B_s[\text{John ate an apple}] \longleftrightarrow B_s[\text{John ate a banana}]$

b. $B_s[$ John ate an apple and a banana $\longleftrightarrow \bot]$

The first inference due to the split of the disjunction yields the inference that if the speaker believes that John ate one of the two fruits, s/he believes that John ate the other one as well (see (14-a)). This inference remains a primary inference for reasons discussed above. The second inference is presented in (14-b) (the alternative with the connective $\otimes_\bot$ which is used to mimic a stereotypical stronger replacement is contradictory in this case, hence the $\bot$-sign). Overall, we obtain that the speaker believes that John did not eat both fruits (the exclusive reading of the disjunction) and that s/he does not know which fruit John actually ate.[1]

This example illustrates several aspects of the present proposal. First, it illustrates how regular scalar items are handled: the $\langle$ or, and $\rangle$-scale yields the exclusive reading of the disjunction (see (14-b)). Second, it illustrates how connectives give rise to additional alternatives, and how these alternatives lead to usual "ignorance" inferences.[2] As shown in the next example, the counterpart of this ignorance inference yields the free choice effects when nothing blocks the primary similarity inference to be enriched into a secondary similarity inference.

3.2 Free choice effects

Consider example (1) repeated below as (15).

(15) John may eat an apple or a banana.

This sentence comes with two sets of alternatives: 1) the alternatives obtained from stronger replacements of the item *or* (see (16)) and 2) the alternatives obtained from splitting the connective phrase in two (see (17)):[3]

(16) a. John may eat an apple and a banana.
b. John may eat an apple $\otimes_\bot$ a banana. , i.e. $\Diamond\bot$, i.e. $\bot$

(17) a. John may eat an apple.
b. John may eat a banana.

Applying the similarity principle to each of these sets yield the following primary inferences:

[1] If the speaker believed that John ate an apple, s/he would also believe that John ate a banana which is incompatible with the exclusive reading. Hence, the speaker does not believe that John ate an apple, and by the same reasoning s/he does not believe that the speaker ate a banana.

[2] The alternatives obtained are standard, the way they are treated is new although it is very close to a proposal from Klinedinst (2005).

[3] I disregard the alternatives potentially raised by the existential modal.

(18) $B_s[$ John may eat an apple and a banana $] \longleftrightarrow B_s[\,\bot\,]$
i.e. $\neg B_s[$ John may eat an apple and a banana $]$

(19) $B_s[$ John may eat an apple $] \longleftrightarrow B_s[$ John may eat a banana $]$

Each of these primary inferences can be enriched into its secondary version:

(20) $B_s[$ John may eat an apple and a banana $\longleftrightarrow \bot\,]$
i.e. $B_s[\neg$John may eat an apple and a banana $]$

(21) $B_s[$ John may eat an apple $\longleftrightarrow$ John may eat a banana $]$

Indeed, nothing prevents us from drawing these strong inferences, since the outcome is consistent. Overall, the speaker should believe that John cannot eat both fruits (see (20)), although John may eat an apple just as much as John may eat a banana (both cannot be false because of the bare meaning of the sentence, hence both have to be true because of (21)). This reading corresponds to the free choice permission effect mentioned in the introduction.

Quite generally, the present proposal predicts that ignorance implicatures and free choice effects may alternate, depending on whether the inference relying on the connective split can acquire its "secondary" version (as in modal contexts such as (15) and in various other quantified environments) or not (as in non-embedded contexts such as (5)).

4 Extension to presupposition

The most interesting virtue of the present proposal is that it can be extended to account for the projection properties of presupposition. To do so, one must simply define alternatives raised by presupposition triggers. The projection behavior of presupposition would then simply follow from the semantics of the embedding environment.

4.1 Alternatives

For the purpose of this paper, I will simply postulate that a presupposition trigger of the form $S\langle p\rangle$ (e.g., the phrase *know that p*) clusters two sets of alternatives together:

(22) a. p, $\top$
b. $\neg$p, $\bot$

The underlying idea is that the presupposition trigger raises the question as to whether its presupposition holds (p or not p?). For the purpose of this paper, I simply rely on its own empirical predictions to motivate this hypothesis.

4.2 Simple case

Consider the sentence in (23):

(23) John knows he's lucky.

(23) raises two sets of alternatives:

(24) a. p, $\top$
b. $\neg$p, $\bot$

These sets of alternatives raise the following similarity inferences: $B_s[\,p \longleftrightarrow \top\,]$, and $B_s[\,\neg p \longleftrightarrow \bot\,]$.[4] Both inferences boil down to $B_s[\,p\,]$: p is indeed the presuppositional inference we want to derive for (23).

4.3 Negation

Consider now the negation of the previous sentence:

(25) John doesn't know that he's lucky.

(25) raises the same sets of alternatives as (23), except that everything has to be embedded under negation:

(26) a. $\neg(\ p), \neg(\top)$ i.e. $\neg p, \bot$
b. $\neg(\neg p), \neg(\bot)$ i.e. $p, \top$

These are the same alternatives as above, and the similarity inference is also the same: a sentence and its negation trigger the same presupposition.

4.4 Quantified examples

More interestingly, the present proposal makes fined-grained predictions for presupposition triggers embedded in various quantified environments. I present here the case of the scope of the quantifier *None* which best illustrates this point. Experimental results from Chemla (2007) show that presupposition triggers embedded in the scope of *No* support universal inferences:

(27) None of these students knows that he's lucky.
Universal inference: Each of them is lucky.

[4] I disregard the 'primary' inferences here. Interestingly, they would lead to the same overall result.

This inference is predicted by the present proposal. To see this, consider a schematic version of the sentence above:

(28) No x: S⟨x⟩.

Because this sentence contains a presupposition trigger, it raises two sets of alternatives:

(29) a. No x: p(x), No x: ⊤
b. No x: ¬p(x), No x: ⊥

'No x: ⊤' (roughly: 'no individual is such that the tautology is true') is false and 'No x: ⊥' (roughly: 'no individual is such that the contradiction is true') is true.[5] Hence, similarity predicts the following inferences:

(30) a. B_s[¬(No x: p(x))]
b. B_s[No x: ¬p(x)]

The b. inference above says that no individual is such that the presupposition does not hold for him/her. In other words, every individual satisfies the presupposition, and this is the universal inference we expect. The other inference is the existential counterpart of this inference (some individual satisfies the presupposition), it is logically weaker than the universal inference in b. and thus yields no additional prediction.

Hence, the present proposal derives the universal inference we expect for (27). Importantly, it does not predict universal inferences in corresponding cases for scalar implicatures. It predicts an existential inference for the following sentence with the scalar item *all* embedded in the scope of the quantifier *None*:

(31) None of these students read all the books.
Existential inference: at least one of them read some of the books.

The only set of alternatives which is created by the scalar item *all* patterns like (29-a) above and this predicts an existential inference corresponding to (30-a), and no universal inference corresponding to (30-b). In short, presupposition triggers project stronger inferences than scalar items, simply because they raise more alternatives.

5 Conclusion

I very briefly presented a new system which reconciles scalar implicatures and free choice effects. The core difference with standard accounts of scalar implicatures is the following:

[5] This is the case provided that the domain of individuals is not empty, which I assume here for simplicity.

under the present proposal, the treatment of a given alternative depends on the transformation which leads to this alternative (e.g., replacement of an item by a stronger or a weaker item) rather than on the comparison between the sentence and its alternatives as a final product.

Assuming new alternatives for presupposition triggers, the present proposal also provides a solution to the projection problem for presupposition. This extension maintains the distinctions between the projection properties of the two phenomena because the structures of the alternatives involved differ, but the underlying projection system is identical.

The present system is an existence proof that the differences between the projection behavior of presuppositions and scalar implicatures are minor. If this is correct, then it suggests that we should pay more attention to other aspects of the two phenomena, e.g., are the status of these two types of inferences so different (scalar implicatures are supposed to be inferences about the speaker's beliefs and presuppositions are supposed to be preferentially about the common ground)? Ideally, this type of questions should find an answer from a better understanding of the triggering problem. In the present framework, the triggering problem boils down to the following question: where do alternatives (of scalar items or presupposition triggers) come from?

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Property-type Objects and Modal Embedding*

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Abstract

Verbs in West Greenlandic require a special piece of morphology, the antipassive, in order to take narrow-scope indefinite objects. Opaque objects of intensional verbs require the same treatment. This paper develops a semantics for the antipassive morpheme in West Greenlandic that shifts the verb's object position to a property-type, providing for the object's narrow scope, while introducing modal embedding. The modal embedding provides for the interpretation of opaque objects of intensional verbs, in a way syntactically constructing the intensional construction. The modal embedding of property-type object constructions is visible not just in West Greenlandic antipassives but also in Hindi-Urdu and even English, suggesting a generalized modalization in the combination of verb with property-type object.

1 Narrow scope indefinite objects

Many languages mark a distinction between indefinite objects which must take narrow scope with respect to operators such as negation, modals and verbs with intensional object positions, and those which may take wide scope with respect to such operators. This is the pattern described by Bittner (1987) for the West Greenlandic antipassive construction, where we see an antipassive suffix on the verb and an oblique case marker on the object ((b) examples below). (Canonical objects are provided for contrast in the (a) examples).

(1) Modal operator(Bittner, 1987, ex 29)

a. atuartut ilaat ikiur-tariaqar-pa-ra
of.students one.of.them.ABS help-must-TR.INDIC-1SGE/3SGA
I must help one of the students
$\exists x[x$ is one of the students & it is necessary that (I help $x)$]

b. atuartut ilaa-nnik ikiu-i-sariaqar-pu-nga
of.students one.of.them-OBL help-ANTIP-must-INTR.INDIC-1SGA

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I must help one of the students
It is necessary that ($\exists x[x$ is one of the students & I help $x]$)

(2) Negation (Bittner, 1987, ex 38)

a. suli uqaasia puiu-nngi-la-a
yet his.utterance.ABS forget-NEG-INDIC-3SGERG/3SGABS
He$_i$ had not yet forgotten his$_j$ utterance
$\exists x[x$ is an utterance of his$_j$ & not yet (he$_i$ has forgotten x)]

b. suli uqaasia-nik puiu-0-nngi-la-q
yet his.utterance-OBL forget-ANTIP-NEG-INDIC-3SGABS
He$_i$ had not yet forgotten his$_j$ utterance
not yet ($\exists x[x$ is an utterance of his$_j$ & he$_i$ has forgotten $x]$)

(3) Verb with intensional object position (van Geenhoven and McNally, 2005, 892)

a. Juuna-p atuagaq ujar-p-a-a.
J.-ERG book.ABS look.for-INDIC-TRANS-3SG.3SG
Juuna is looking for the book/a specific book.

b. Juuna atuakka-mik ujar-lir-p-u-q.
J. book-OBL look.for-ANTIP-INDIC-INTRANS-3SG
Juuna is looking for any book

The same type of morphological contrast also holds even when no scope bearing operator is present in the clause, however, both in West Greenlandic and in other languages marking similar scopal contrasts in object position (e.g. Hindi-Urdu, Mohanan (1995), Dayal (2003)).[1]

(4) Antipassive alternation without higher scopal operator (Bittner, 1987)

a. Jakku-p ujarak tigu-a-a
J.-ERG stone.ABS take-TRANS.INDIC-3SGE/3SGA
Jacob took a/the stone

b. Jakku ujaqqa-mik tigu-si-vu-q
J stone-OBL take-ANTIP-INTRANS.INDIC-3SGABS
Jacob took a stone

[1]The glossing here reflects the view that antipassive objects are restricted to indefinite interpretations. Bittner (1987) argues against this generalization based on cases where names, pronouns and demonstrative phrases appear as antipassive objects, as e.g. in (i).

i. Jesusi-mik taku-si-vu-q
Jesus-OBL see-ANTIP-INTRANS.INDIC-3SGA
He saw Jesus (Bittner, 1987, 196)

Cases with names as narrow-scope-only objects can also be constructed in Nez Perce, a language that like West Greenlandic lacks articles; these names are crucially not interpreted referentially, receiving instead a 'somebody called X' reading. It may be that the West Greenlandic examples that pose a problem for a straightforward account of antipassive objects as indefinite merit a similar analysis, as also suggested by Manning (1996, 94) (though the extension to pronouns and demonstrative descriptions will require further investigation). Michael Fortescue (p.c. to Manning) notes that the object of (i) is interpreted by Greenlanders referring not to Jesus but to the "concept of Jesus", suggesting some fundamental problem with definite/referential interpretations of antipassive objects.

The indefinite object of (4a) and that of (4b) are not semantically distinguished in terms of scope, as there is no higher scopal operator in the clause. Antipassive objects' restriction to narrow scope in cases like (1)-(3) does not arise from a need to be in some way licensed by a higher operator, as we see in (4) (cf. the case of NPIs); it must arise through some feature of the antipassive construction itself. In keeping with analyses of objects with obligatory narrow scope in other languages (i.a. Farkas and de Swart 2003, Dayal 2003, Wharram 2003, Chung and Ladusaw 2004), van Geenhoven and McNally (2005) suggest that the antipassive object be analyzed as predicative or property-type.[2] The non-quantificational, property-type semantics of the object prevents it from undergoing QR and thus taking scope other than in its base position, explaining antipassive objects' inability to scope above modals in cases like (1b) and negation in cases like (2b). We might further assume that, as in other languages, the predicative object is an NP, not a DP; presumably this is at the root of its oblique case-marking. But West Greenlandic differs from languages such as Hindi-Urdu, Hungarian and Maori in using special pieces of verbal morphology – antipassive morphemes – in constructions where objects are property-type. What is the role of these morphemes? In an analysis of closely related Inuktitut, Wharram (2003) proposes that antipassive verbal morphology serves to syntactically mediate the composition of a verb with a property-type object:[3]

(5) ANTIP (Wharram, 2003, p. 69):
$\lambda P_{<e<s,t>>}\lambda Q_{<e,t>}\lambda e\ \exists x.P(x)(e)\ \&\ Q(x)$

This morpheme attaches to a verb with an entity-type object position and converts this position to a property-type. Applied to a verb, it produces a verbal constituent with a denotation equivalent to the verb's semantically incorporating form in van Geenhoven's (1998) sense. With an extensional verb like *help* (1) or *forget* (2), this produces the desirable result of keeping the object's scope under modals and negation; the object scopes with the verb.

The situation is a little bit different, however, with intensional verbs like *look for*, as in (3). Such verbs are well-known for their ability to give rise to contrasts of *de re/de dicto* interpretation in their object positions. As argued by Zimmermann (1992, 2006), intensional verbs in their most basic form have property-type object positions, permitting *de dicto* object readings; thus van Geenhoven (1998) noted that "an intensional verb is semantically incorporating par excellence" (p. 179). On Zimmermann's treatment, no lexical rule or typeshift of semantic incorporation or syntactic shift via antipassive affixation should be necessary for such verbs to take property-type objects. Yet we see in (3) that the West Greenlandic verb *ujar* 'look for' apparently cannot take a property-type object in its most basic form. To get the narrow scope, *de dicto* interpretation for the object, an antipassive construction is required. As van Geenhoven and McNally (2005) note, this pattern is a challenge for Zimmermann's proposal that *de dicto* object

[2]Stiebels (2006, 558) makes the same suggestion for antipassives with overt objects in Mayan languages.

[3]In (5) t is the type of propositions, following Wharram, and s is the type of events; thereafter t is the type of truth values and w is the type of worlds. Note that Wharram assumes that agent arguments are not part of the denotations of verb roots, as discussed below.

readings are basic (at least for intensional verbs) and that *de re* object readings are derived (e.g. via QR or type-shifting). The situation in West Greenlandic looks exactly reversed: the *de re*, entity-type object verb is basic (lacking an antipassive morpheme), and the *de dicto*, property-type object verb is morphologically derived.

The semantics of the antipassive marker in combination with intensional verbs also deserves comment. If the opaque reading of these verbs is derived with the help of antipassive morphology, can we use Wharram's ANTIP denotation (5)? We cannot; the existential closure over the object will fall outside of modal quantification contributed by the verb. As commonly conceived, *look for* introduces a set of accessible worlds, the "successful-search worlds", in which the object is found. Thus a modal quantifier $\forall w$ is part of the lexical meaning of *look for*. To derive an opaque reading, we need the scopal relation $\forall w > \exists x$: in each successful search world, there is a potentially different x that is found. But combining ANTIP (5) with a verb does not allow us any compositional way of embedding the existential closure over the object (which ANTIP contributes) inside the verbal meaning to derive the correct scopal relation. Rather, we end up with $\exists x > \forall w$, deriving only a transparent, *de re* reading, in contrast to the attested meaning in (3b).[4]

The antipassive alternation in (3) thus poses a morphological challenge and a semantic one. We must explain why an antipassive construction is necessary to obtain an opaque/*de dicto* reading for the object of an intensional verb; we must develop a semantics for the antipassive marker that allows this reading to be compositionally derived. What we have in hand from West Greenlandic is a contrast between simplex verb forms with definite or (wide-scope) indefinite objects and complex verb forms with narrow scope indefinite objects. This morphological picture suggests that we must take verb roots in West Greenlandic, intensional or extensional, to have entity-type object positions. Wharram's insight that an antipassive morpheme allows an entity-taking verb to take a property-type object seems well justified. To make this proposal work for intensional verbs, we will need two adjustments to the picture so far: a theory of intensional verb roots that allows them (like extensional verb roots) to take entity-type objects without derivation; and a denotation for antipassive morphology such that when ANTIP and a verb combine, existential closure over the object is embedded within the scope of the modality associated with the verb.

[4]The same problem is relevant to the analysis presented by Chung and Ladusaw (2004). On their theory, property-type objects combine with verbs via a mode of composition Restrict which allows the property to restrict the verb's object argument without saturating it. Existential closure over the object position comes in higher in the structure. We might adapt this analysis to the West Greenlandic facts by supposing that the job of ANTIP is to trigger Restrict. In this case as well, however, we risk having existential closure too high in the case of intensional verbs. It appears that the Restrict theorist would be forced either to abandon Restrict for intensional verbs, or to adopt a structure for these verbs' complements that is perhaps more sentential, allowing a lower place for existential closure (as suggested by Quine (1960); but see Schwarz (2007) on the generality of sentential analyses).

2 Modal embedding

Some interesting evidence from West Greenlandic suggests a possible way forward on this latter issue of modal embedding. Bittner (1987) notes that in sentences (6), the use of an antipassive correlates with the introduction of otherwise unexpected modalization. The verb *qimat* 'leave' is not an intensional verb, and accordingly, transitive clause (6a) entails that what was left by the agent was, objectively speaking, a hunting hut. But antipassive (6b) does not make this commitment. Rather, it tells us only that what the agent left was something he had *used* as a hunting hut, be it a tent or a cave or anything else.[5]

(6) a. illuigaq qimap-pa-a
hunting.hut leave-TRANS.INDIC-3SGERG/3SGABS
He left a hunting hut

b. illuikka-mik qimat-si-vu-q
hunting.hut-MOD leave-ANTIP-INTRANS.INDIC-3SGABS
He left a hunting hut (Bittner, 1987, ex. 80)

Noting this contrast, Bittner remarks:

> There is evidence suggesting that, in [West Greenlandic], all antipassive predicates are world-creating, even if their transitive counterparts denote purely extensional predicates. The sets of worlds that the antipassives create are subjective worlds of the agent – worlds in which things are as he perceives them or intends them to be. (Bittner, 1987, p. 225)

What would it look like to develop a theory of the worlds that the antipassive morpheme "creates"? We would need to add modal quantification to our ANTIP denotation. The existential closure over the object can be relativized to the possible worlds picked out by ANTIP's accessibility relation. The accessibility relation we pick will have to respond to a number of desiderata. ANTIP needs to be able to embed both intensional and extensional verbs. To get intensional verbs right, it will need to preserve certain modal relations that hold in the actual world, as we will see in section 3. Bittner's remark suggests that a teleological relation might be right for this purpose, i.e. one based on an agent's intent. I will develop this hypothesis a little here.

In order to add a modal component to Wharram's ANTIP, (5), syntactic and lexical assumptions need be considered. Following Kratzer (1996, 2003), Wharram assumes that agent arguments are not true arguments of verb roots; they are introduced by an independent head Voice. If we adopt this assumption, at the point when an antipassive morpheme combines with a verb root, the agent has not yet been introduced, and therefore reference to modal intent cannot be syntactically connected with it. How, then, could the antipassive morpheme introduce modal quantification by intent? We might

[5]Such interpretations of extensional verbs inveigh against adopting a means of modal embedding in property-type object constructions that applies *only* to intensional verb roots, as proposed by van Geenhoven and McNally (2005).

still make *indirect* use of an agent's intent if we take advantage of the verb's event argument. Suppose that we can retrieve from an event the agent of the event, and that the agent might have some intent in participating in the event. Speaking modally, there is some condition that holds in all the worlds in which the agent's intent for that event is fulfilled. The event which is performed with some purpose in mind might then have this modal relation of intent directly associated with it. It is an event with telos. The truth conditions of a sentence containing a purpose clause, for instance, like *Lindy sat by the fire (in order) to warm up*, may require that the sitting event in which Lindy participates carries a telos of Lindy warming up. We might introduce a function INTENT, type $< s, wt >$ (a function from events to propositions), which retrieves from an event with associated telos the set of worlds compatible with that telos.[6] On our hypothesis that the modal accessibility relation introduced by ANTIP is a teleological one, all verbs that combine with ANTIP must name an event with associated telos. Events named by intensional predicates like *want*, *need*, *look for*, and the like do seem compatible with such an accessibility relation: wanting and needing are aiming to have, looking for and seeking are aiming to find, etc. Making our hypothesis explicit, (and keeping syntactic changes to a minimum,) we can revise Wharram's ANTIP as follows:[7]

(7) $[\![\text{ ANTIP }]\!] = \lambda P_{<e<s,wt>>}\lambda Q_{<e,wt>}\lambda e\lambda w \,.\, \forall w' \in \text{INTENT}(e) : \exists x.Q(x)(w') \,\&\, P(x)(e)(w')$

As before, this head attaches to a verb (P) and mediates its composition with a nominal (Q), which must be property-type, but now in the process it also modally embeds the description of both verb and noun.

Modalization, of course, must be in some way constrained with extensional verbs in order to derive their differences from intensional verbs. In many cases, verbs in property-type object constructions can indeed say something about the actual world, even if this is not clearly the case in (6b). Why should this be? A helpful language in this connection is Hindi-Urdu, which has also been argued to use property-type objects by Dayal (2003). When animate objects in Hindi-Urdu are not case-marked, they must be indefinite and have narrow scope with respect to higher operators, just like West Greenlandic antipassive objects:

(8) anu bacca nahii sambhaal-egii
Anu child not look.after-FUT.F

[6] Hacquard (2006) has argued that accessibility relations generally hold between events and sets of worlds. Parallel to INTENT, she proposes a CONTENT function which retrieves from a believing eventuality the set of doxastic alternatives.

[7] Alternatively, if we let agent arguments be introduced by verb roots, we might use a denotation as follows:

i. $[\![\text{ ANTIP }]\!] = \lambda P_{<e<e<s,wt>>>}\lambda Q_{<e,wt>}\lambda y\lambda e\lambda w \,.\, \forall w' \in \text{INTENT}(y) : \exists x.Q(x)(w') \,\&\, P(x)(y)(e)(w')$

Here INTENT is a function from individuals to the set of worlds compatible with their intent. The INTENT function from events might also be used, of course, even if agent arguments are introduced by verb roots, but it need not.

Anu will not look after children. (Dayal, 2003) [$\neg > \exists x$; $^*\exists x > \neg$]

Mohanan (1995) noted that such objects in Hindi-Urdu do not always give rise to existential entailments, even with extensional verb roots. This suggests that in Hindi-Urdu, just as in West Greenlandic, property-type object constructions are in some way modalized. Although we see no antipassive morpheme on the Hindi-Urdu verb, perhaps we can appeal to a covert ANTIP in Hindi-Urdu. If this is the case, semantic commonalities between the two languages' property-type object constructions have their root in structural commonalities, a desirable result. In both languages, adding ANTIP to a verb root (intensional or extensional) produces a modalized structure. In Hindi-Urdu, however, higher structure can interfere with this modalization, producing an existential entailment in certain cases. Dayal (2003) noted that the determining factor seems to be viewpoint aspect. When a verb is marked perfective, the event described by the verb must take place in the actual world. With the imperfective, this is not the case. The following pair from Rajesh Bhatt (p.c.) illustrates the contrast:

(9) a. Anu baccaa sambhaal-tii hai
A child take.care-IMPERF.FSG be.PRS.SG
Anu takes care of children
> There need not be children that Anu has actually taken care of

b. Anu-ne baccaa sambhaal-aa
A-ERG child take.care-PERF.MSG
Anu took care of children
> There must be some actual child that Anu has taken care of

This difference recalls the case of low modals under perfective in Hindi-Urdu, where not merely unactualized modality but also real world instantiation is required:

(10) Yusuf havaii jahaaz uṛaa sak-aa (# lekin us-ne havaii jahaaz nahĩĩ
Yusuf airplane fly can-PERF (but he-ERG airplane NEG
uṛaa-yaa)
fly-PERF)
Yusuf could fly the airplane (# but he didn't fly the airplane) (Bhatt, 1999, ex. 321b)

On the analysis of ANTIP as in (7), it is not surprising that it should pattern like ability modals in showing these "actuality effects" under perfective aspect. Both ANTIP and ability modals contribute modal quantification; both are syntactically low. Presumably, then, whatever it is that is responsible for the actuality effect under perfective in (10) can also explain the existential entailment brought about by perfective in (9b). Here is one way this might go. Actuality effects on low modals have been analyzed by Hacquard (2006) as arising because perfective aspect makes a commitment to an event occurring in the actual world. In a case like (9b) or (10), we have a commitment to an actual event, but the only description of that event is modally embedded; i.e. in (10) we have an actual event and in worlds compatible with Yusuf's ability, that event is an airplane-flying. Hacquard proposes that when we describe an event across multiple worlds, we can

take certain features of the event's description to be stable across worlds. If e exists in the actual world, and e is an airplane-flying in some set of worlds W, we conclude that e is an actual world airplane-flying as well. We use a process of *trans-world event identification*, exporting the event description to the actual world, to produce the actuality entailment. Applying this analysis (which is developed in much greater detail by Hacquard) to (9b), we have an actual event which in the worlds compatible with its associated intent is a childcare event; we reason that in the actual world, the event is a childcare event as well. The denotation for (9b) up to Perfective (but excluding tense and higher material) is given below.

(11) $\lambda t\ \exists e\ .\ \tau(e) \subseteq t\ \&\ Ag(Anu)(e)(w_0)\ \&\ \forall w' \in \textsc{intent}(e)$:
$\exists x.child(x)(w')\ \&\ \mathbf{take.care(x)(e)(w')}$

What Hindi-Urdu shows us is that it is perfective viewpoint aspect that is in a sense responsible for the extensionality of the antipassivized verb. The verb itself is intensionalized by the presence of ANTIP, a low modal operator. With structures containing low modalization – ability modals or ANTIP – perfective has an "actualizing" effect. If Hacquard is right about the origin of this effect, perfective combines with a verbal constituent that denotes an (intensionalized) predicate of events and contributes existential quantification over events while anchoring the event description to the actual world. In a case like this one, however, part of the event description has its world argument already bound by the modal quantification of ANTIP. Thus e is an event which in the actual world has Anu as its agent, and which in certain possible worlds is a childcare event. We export to the actual world the description that holds in the possible world set; we end up with actual-world childcare.

Looking a little closer, this gets us actual-world existential import for the object with the help of two factors. The major reason is the presence of perfective aspect and hence actual-world event anchoring. But the structure of the event description has a role to play as well. Our commitment to an actual event which is in some worlds a caretaking event could not be cashed out just by actualizing the description boldfaced above, because this description has an open argument x. We must also "export" to the actual world the existential quantification over x, and accordingly the description of x as well. It is from this that it follows that there are actual children. This detail of the structure of extensional verb roots will play an important role in distinguishing them from intensional verb roots.

The state of our progress on the question of modal embedding is thus as follows. Although the question first arose when we looked at Wharram's ANTIP in combination with intensional verbs, we saw that modal effects are present in antipassive constructions even with extensional verb roots, and noted Bittner's proposal that all antipassive constructions in West Greenlandic are "world creating". In response, we modalized ANTIP, tentatively assigning it a teleological accessibility relation which is retrieved from an event. Exploring the origins of extensional behavior when ANTIP combines with an extensional verb, we found in Hindi-Urdu that a crucial role is played by perfective aspect. We saw that extensional verb roots with property-type arguments, intensionalized by ANTIP, may only return to apparent extensionality with the help of aspectual

structure. We also noted a connection between the effect of perfective aspect on ANTIP constructions and similar "actuality effects" on ability modals. Actuality effects, it has been noted, do not obtain in all languages; they do not, for instance, obtain in English (e.g. *He was able to fly the airplane* does not entail that any airplane-flying actually occurred). This may be related to why we obtain less than fully extensional behavior in a case like (6b), the hunting hut example; our prediction is that West Greenlandic should not show actuality effects. If the analysis of property-type object constructions in term of ANTIP should be cross-linguistically extensible, it may also be of some help in clarifying why so many apparently extensional English verbs should be able pass tests for intensionality in contexts noted by Moltmann (1997). The roots of these verbs need not involve modal quantification (i.e., they are truly extensional); their apparent intensionality comes from a silent ANTIP, along with the absence of actuality effects in English.

3 Intensional verbs

We turn next to the representation of intensional verbs. We saw above that intensional verbs in West Greenlandic behave just like extensional verbs in taking entity-type objects in their most basic form. They seem to need antipassive morphology to take *de dicto*, property-type objects. This suggests that their roots have what we might call a "transparent" semantics, where there is no binding of a world argument in the object nominal.

Developing a semantics for these roots, we can preserve from earlier analyses the insight that intensional predicates quantify over possible situations. (I assume that situations are parts of worlds, proper or improper; see Kratzer 2007. The same semantic type w is used for worlds and situations.) Of course, particular intensional predicates quantify over particular sets of situations; *want* quantifies over situations where wants are met, whereas *seek* quantifies over situations where quests are successful. The predicate seems to determine the accessibility relation. I will pursue the appealingly simple position here that differences in accessibility relations are in fact the *only* thing that differs from intensional predicate to intensional predicate.[8] We might suppose that intensional verbs locate their object in the situations determined by the accessibility relation. (A similar analysis in terms of quantification over "satisfaction situations" is discussed in Moltmann 1997.) Here are some sample denotations:[9]

[8]This is if we confine ourselves to the semantics. In the syntax, roots may have variable selectional restrictions; for instance *want* must be agentive, whereas *need* need not. When *need* does not combine with Voice, it can function as a raising verb (much like modals):

(i) The sink$_i$ needs t_i to be fixed

(ii) ?? The sink$_i$ wants PRO$_i$ to be fixed

Want, by contrast, can only be a control verb. It requires an agent.

[9]These denotations allow *want* and *seek* to take entity-type arguments; in combination with ANTIP, they will take property-type arguments. Separate denotations for these verbs will be needed to analyze cases with propositional arguments, e.g. *Anne wants/seeks to win the tournament.* Why two denotations?

(12) $\sqrt{WANT}$: $\lambda x \lambda e \lambda w. \forall s \in \text{DESIRE}(e)(w) : x \leq s$
[where DESIRE is a function from events and worlds to propositions (bouletic alternatives)]

(13) $\sqrt{SEEK}$: $\lambda x \lambda e \lambda w. \forall s \in \text{SUCCESS-SEARCH}(e)(w) : x \leq s$
[where SUCCESS-SEARCH is a function from events and worlds to propositions (successful-search situations)]

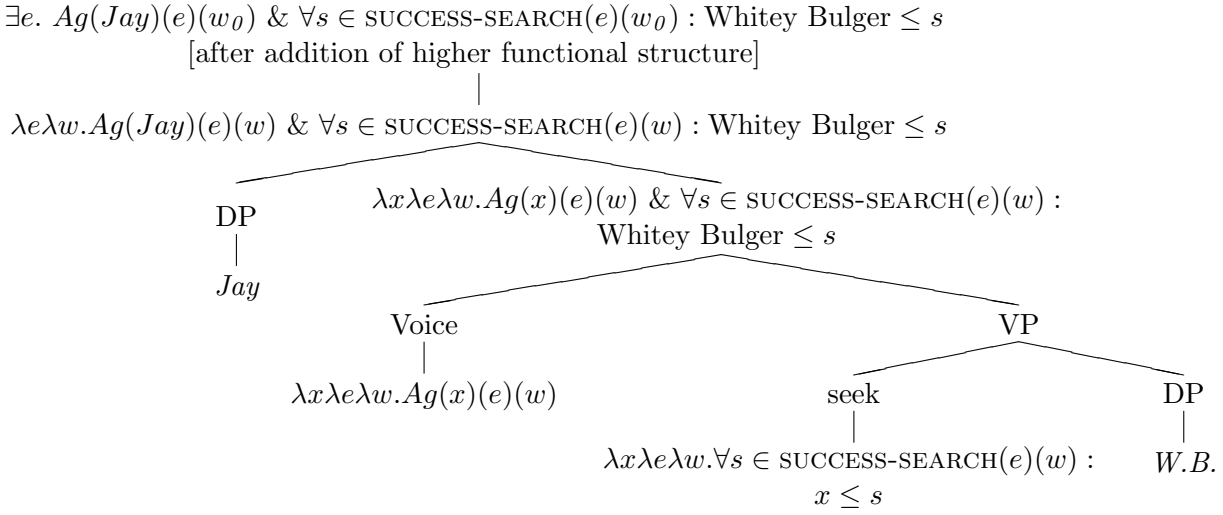
These sample denotations for *want* and *seek* make use of different accessibility relations, but use them in the same way. *Want* locates individuals within situations that belong to the bouletic alternatives associated with the wanting event. All wanting events bring in a set of bouletic alternatives; that is what makes them wantings. *Seek* locates individuals within successful-search situations. Likewise, all seeking events will be associated with the successful-search accessibility relation. The correlation also holds in reverse: events associated with bouletic alternatives are wantings, and events associated with successful-search situations are seekings.

Given these root denotations, the simplest way to examine the semantics of intensional roots is to feed them a basic expression of type $< e >$ – a name. In this case the nominal will directly serve as argument of the root, without requiring (or allowing) ANTIP or other trappings.[10] (Thus, here, there will be no modalization in terms of intent.) Let us take a look at what we might say for a sentence like (14), *Jay sought Whitey Bulger*. Here the object is a name; it can combine directly with the denotation of *seek* in (13). We add Voice to introduce the agent (Kratzer, 1996); functional structure such as Aspect provides existential closure over events and grounds the event to the actual world. We now have an actual event with an actual-world agent which is, in the actual world, associated with a successful-search accessibility relation. If we can assume that such relations are only associated with seeking events, we have actual world seeking, as desired. This (seeking) event is such that all situations which correspond to its success contain Whitey Bulger.

It has been proposed (e.g. by Larson et al. 1997) that verbs such as *want* and *seek* in fact always take propositional complements; in cases where no propositional material can be seen directly, a covert predicate HAVE is present. Evidence for this position comes from adverbial modification and the scope of quantifiers and negation. However, as Schwarz (2007) notes, the case for a covert clause under these verbs can only be made when the silent lower-clause predicate is HAVE. In cases like *John needs a marathon*, however, where the relation between John and a marathon will not be one of possession, the evidence for a covert clause goes suddenly missing. Schwarz proposes that in these cases, the verb's complement is a property-type nominal (type $< e, st >$) which undergoes an existential closure operation to be of type $< s, t >$, the type of propositions. This proposition-type nominal then combines with the verb. This anticipates the analysis given here, where existential closure over the property-type nominal is provided by ANTIP. The present proposal differs from Schwarz's in not giving a single denotation to proposition-taking versions of verbs like *want* and their entity-taking counterparts, however.

[10]This is to say that there is no modal quantification over type $< e >$ objects. We might wonder whether this extends to definite objects, a class that has been described as showing *de dicto/de re* ambiguities in intensional contexts (Quine 1960, Zimmermann 1992), e.g. *John is looking for the dean*. The languages we have considered here, however,–Hindi-Urdu and West Greenlandic–systematically classify definites with wide-scope (or scopally variable) indefinites, not with property-type indefinites. Accordingly, I will assume that the so-called *de dicto* definites are not to be analyzed as property-type; another analysis is required. I have argued elsewhere that definites appear to be *de dicto* when they are used without familiarity with the referrent of the description (Deal, 2007).

(14) Jay sought Whitey Bulger.
≈ *Jay is the agent of an actual event e, and all successful-search situations of e contain Whitey Bulger.*



We turn now to the derivation of property-type object positions with intensional verbs, a sentence like *Jay is seeking a book* (nonspecific). Here, as before, the verb combines with ANTIP and the resulting constituent combines with a property-type object. Combining our denotation for the root of the verb *seek* (13) with ANTIP, and then adding a property-type object, we produce (15) after existential closure over events and relativization to the actual world w_0, provided by perfective aspect.

(15) $\exists e.\ Ag(\text{Jay})(e)(w_0)\ \&\ \forall w' \in \text{INTENT}(e) : \exists x.book(x)(w')\ \&$
$\forall s \in \text{SUCCESS-SEARCH}(e)(w') : x \leq s$

Bringing ANTIP together with an intensional verb, we come up with a sort of double modalization. (15) says that there is an actual event, that Jay is its agent, and that in each world compatible with its associated intent there is a book b which is part of all situations which correspond to success for the event. To derive the correct predictions here we will need to suppose that the modal accessibility relation carried by ANTIP, which we have been hypothesizing is a teleological one, will preserve events' accessibility relations from the actual world; we want the successful-search conditions to be the same in the worlds we access via intent as they are in the actual world. (This kind of modal "transitivity" is a desideratum for any accessibility relation we may propose for ANTIP.)

Now, in (15), as in the cases of extensional verbs with property-type object positions under perfective aspect (9b), we have an actual event and various modalized descriptions. However, Dayal (2003) reports that in contrast to extensional predicates with property-type objects, intensional predicates never yield actuality effects. A meaning like (15) will never commit us to the existence of books. Intensional verbs differ in this regard from low modals and from extensional verbs with ANTIP. Why should this be? I think the most likely culprit is the fact that intensional verbs do not describe events in the

same way as extensional verbs do. Rather, they name accessibility relations for locating objects in possible situations. The structure of the event description is different. We know in (15) that there is an actual event which in some possible worlds is associated with an accessibility relation via its goal. Perhaps this information, boldfaced in (15), can be cross-modally exported to the actual world. But this will not get us actual books; note that the event description can be exported without having to export the object variable x. All that we can reason cross-modally about is the existence of an event with an associated goal, which gives us actual-world seeking, but not actual world success.

4 ANTIP in English

Distinctions in the morphosyntax of object nominals are used in many languages to encode information very similar to what we've seen for West Greenlandic and for Hindi-Urdu; a special class of objects, usually exhibiting reduced morphosyntax, must have narrow scope with respect to higher operators and is interpreted opaquely as the complement of an intensional verb. A pattern like this can in fact be found in English in the morphosyntax of certain objects of intensional predicates like *want*, *need* and *look for*, as well as apparently extensional predicates like *find* and *count*, as noted by Moltmann (1997). English generally requires the personal forms *someone* and *who* for reference to a (full-grown) human; impersonal *something* and *what* cannot be used. However, for certain verbs, impersonal form objects can be used even with reference to a human. In these cases, however, the object has necessary narrow scope, and opaque interpretation as the object of an intensional verb. Fully personal *someone*/*who* is not interpreted opaquely, and need not have narrow scope with respect to a higher modal.

(16) a. Beth is looking for something/#someone, namely a secretary. [opaque interp. with *something*]

b. Beth is looking for someone/#something, namely Kate/the dean. [transparent interp. with *someone*]

(17) a. (In order to win the contest), Beth has to find something quite unusual in her class, namely a genius. [*has to* $> \exists x$]

b. (In order to win the contest), Beth has to find someone quite unusual in her class. [$\exists x >$ *has to*]

The substitution of impersonal *something* for personal *someone* seems to be another instance of a language using pared-down morphosyntax for a narrow-scope-only indefinite object. The cross-linguistic recurrence of patterns like this raises the question of how broadly the ANTIP analysis might be extended. English verbs (like Hindi-Urdu verbs) show no antipassive inflection, and thus we cannot see directly which form of a verb, entity-taking or property-taking, is the more basic one. What we do see in English is that a class of extensional verbs can show intensional behavior when they take indefinite objects; using an impersonal form with human reference disambiguates them in favor

of this intensional meaning. One verb that shows this behavior is *count*, as laid out by Moltmann (1997):

(18) What / #whom did John count? – 10 men and 15 women.

Moltmann notes that *count* on this reading does not give rise to an existential entailment for the object: even if John counted 15 women in the room, there may only be 14; a miscount might have occurred. Zimmermann (1992) noted similar behavior in the case of *own*. This verb also need not give rise to existential entailments for its object, and also can be used with impersonal objects with human reference. Subsequent to a bachelor auction, for instance, we might ask what Kate owns, and receive the answer *a salesman*. (In this scenario, asking *whom* seems to imply familiarity with the set of bachelors auctioned, to be a question about specific individuals; the impersonal question asks instead for a property characterization of the object owned.)

This body of data suggests that in English, as in West Greenlandic, property-type objects can to some degree be recognized morphologically. More importantly, it suggests that the two languages have in common a general ability to turn an extensional verb into an intensional one, bringing in a property-type object. The presence of an ANTIP head in West Greenlandic captures this function compositionally; adopting it in English affords the same advantage.

5 Conclusions

This paper has aimed to unite two facets of the grammar of indefinite objects, like those in the West Greenlandic antipassive, that must take narrow scope: property-type semantics and modal embedding. Property-type object meanings come about when object nominals are smaller than DP, as others have proposed. In West Greenlandic, property-type objects compose with verbs only when an antipassive morpheme has been suffixed. This suggests that the composition relation between a verb and a property-type object is accomplished with the help of syntactic structure, not via a lexical verb form which takes a property-type object (Zimmermann 1992, van Geenhoven 1998) or via a special mode of composition in the semantics (Chung and Ladusaw, 2004). We saw that the antipassive morpheme must do more than just allow a property-type object; it must also provide a way for the existential quantification over this object to be embedded within the scope of the modality associated with a predicate. This was accomplished via a modalization of antipassive. The modalized antipassive morpheme combines with an intensional verb root which does not itself modally quantify over the object. However, the event described by the intensional predicate lends its telos to ANTIP's accessibility relation, in effect extending the reach of the verb's modality over the object position. We saw that the proposal may be extended to English, pointing to an explanation for the wide variety of "intensional verbs" recognized by Moltmann (1997). English need have lexical polysemy no more widespread than West Greenlandic does. Instead of a single verb like *seek* having multiple meanings, opaque and transparent, the transparent meaning is built into the verb root, and the opaque reading results from the verb root

only in combination with antipassive morphology. Opaque/transparent ambiguities in the interpretation of object nominals are in fact structural ambiguities in the analysis of the verbal structure.

In proposing that intensionality is in important measure syntactically constructed, the present work concurs in a sense with sententialist theories advanced by Quine (1960) and Larson et al. (1997). On the present theory, however, there is no special need for sentential embedding in order to produce modal embedding. (For arguments against the pure sententialist perspective on intensional verbs, see Schwarz (2007)). It is well known that modal quantification occurs in various different points in a syntactic structure (Brennan 1993, Cinque 1999); ANTIP is perhaps the lowest that modal quantification can go. Given this syntactic perspective on the construction of intensionality, the findings here (like those reported by the sententialists) may reflect a deeper constraint on the types of meanings that may be borne by verbs. Verbs may be restricted to denoting properties of events and relations between individuals and properties of events. The great variety of their surface complements might then be due not to unconstrainedness in lexical representation, but to the hidden presence of cross-linguistically highly constrained functional items which extend and diversify the varieties of reference to events in natural languages.

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Reference to Kinds in Brazilian Portuguese: Definite Singulars vs. Bare Singulars*

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Abstract

The paper explains the contrast between the generic readings of bare singulars (BSs) and definite singulars (DSs) in Brazilian Portuguese (BrP), which have so far gone unnoticed. BSs in BrP behave like kind-denoting bare plurals (BPs) in English: they may refer to non-well-established kinds, whereas DSs cannot, unless in a comparison context; conversely, DSs can occur in the object position of predicates such as *inventar* 'to invent', whereas BSs cannot. Although both DSs and BSs denote kinds in BrP (Schmitt & Munn 1999 among others, *contra* Müller 2002), they do so through different semantic mechanisms. Kind-referring DSs (in BrP as well as in English) are built by applying the *iota* operator to a property of kinds (Dayal 2004). Kind-referring BSs (in BrP) rely on Chierchia's (1998) down operator, which can apply both to pluralities and to number-neutral expressions, yielding intensional maximal sets.

1 Introduction

The paper analyzes and explains the distribution of the generic readings of count bare singulars (BSs) and definite singulars (DSs) in Brazilian Portuguese (BrP), accounting *inter alia* for the following contrast:

(1) # O pedreiro é preguiçoso
the bricklayer is lazy
'The bricklayer is lazy'

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(2) Pedreiro é preguiçoso
bricklayer is lazy
'Bricklayers are lazy'

In section 2, we provide some evidence that BSs in BrP may refer to kinds (in line with Munn & Schmitt (1999, 2005), Schmitt & Munn (2002), among others, and *contra* Müller (2002)). Section 3 presents the contrasting distribution of generic BSs and generic DSs; it is shown that generic BSs in BrP behave on a par with generic Bare Plurals (BPs) in English. In section 4, we adopt Chierchia's (1998) analysis of BPs and Dayal's (2004) analysis of DSs, which respectively rely on the Down operator and on an *iota* operator that applies to a property of kinds. In section 5 it is shown that the generic readings of BSs in BrP can be analyzed as relying on the Down operator. Section 6 is dedicated to the explanation of the examples introduced in section 3. In so doing, we are led to dispense with the notion of 'well-established' kind.

2 Bare Singulars in Brazilian Portuguese are names of kinds

Based on examples such as (3)-(5), Munn & Schmitt (1999), among others[1], proposed that generic BSs in BrP are names of kinds:

(3) Baleia está em extinção
whale is in extinction
'Whales are on the verge of extinction.'

(4) Computador foi inventado por Babbage
computer was invented by Babbage
'Computers were invented by Babbage.'

(5) Rato foi introduzido na Austrália em 1770
rat was introduced In-the Australia in 1770
'Rats were introduced in Australia in 1770.'

These examples respectively show that BSs may combine with kind-predicates (see (3)), allow generic readings when appearing in the subject position of the passive form of *invent*-type verbs (see (4)), and allow generic readings in episodic contexts such as (5). All these contexts constitute reliable tests for names of kinds, which correlates with the fact that singular indefinites are either ungrammatical or else yield taxonomic readings.[2]

Further evidence for the kind analysis of generic BSs in BrP is related to the 'nomicity' constraint (Lawler (1973), among others). The examples below show that the generic

[1]For instance Pires de Oliveira *et al*. (2006).
[2]For the relevant examples, see Dobrovie-Sorin & Pires de Oliveira (2007)).

reading of an indefinite, which crucially relies on generic quantification, is allowed if the predicate expresses an essential/nomic property of the subject (sentence (6)), but blocked with non-essential properties, (sentence (7)):

(6) ? Um samba é polifônico
a samba is polyphonic
'A samba is polyphonic.'

(7) # Um samba é popular
a samba is popular
'A samba is popular.'

Example (9) shows that this constraint does not affect BSs in BrP, which indicates that their generic reading does not depend on generic quantification, but instead might be related to kind-reference:[3]

(8) Samba é polifônico
samba is polyphonic
'Sambas are polyphonic.'

(9) Samba é popular
samba is popular
'Sambas are popular.'

3 BSs and DSs: two ways of referring to kinds

This section shows that although in BrP both BSs and definite singulars (DSs) denote kinds, they do not behave in exactly the same way. Moreover, the contrast between BSs and DSs in BrP is parallel to the contrast between bare plurals (BP) and DSs in English.

3.1 BSs and DSs in Brazilian Portuguese: some differences

With respect to the tests used in section 2, DSs show the same behavior as BSs: they can combine with kind predicates; when appearing in an episodic context, they engender generic readings; and, finally, they allow a generic interpretation when combined with a non-essential property. However, as observed by Müller (2002), BSs and DSs contrast in certain other contexts:

(10) Garrafa de Coca-Cola tem gargalo estreito
Bottle of Coca Cola has neck narrow
'Coca Cola bottles have narrow neck.'

[3]Note the similar contrast between singular indefinites and bare plurals in English (see the translations).

(11) A garrafa de Coca-Cola tem gargalo estreito
the bottle of Coca Cola has narrow neck
'The Coca Cola bottle has narrow neck.'

(12) Garrafa azul tem gargalo estreito
Bottle blue has neck narrow
'Blue bottles have narrow neck.'

(13) # A garrafa azul tem gargalo estreito
the bottle blue has neck narrow
'The blue bottle has narrow neck.'

Sentences (10) and (11) can be interpreted generically, because Coca-Cola is a 'well established kind' (Krifka *at al* 1995). Compare *garrafa azul* 'blue bottle', which does not refer to a well-established kind. The contrast between (12), which is interpreted generically, and (13), which does not have a generic reading when uttered out-of-the-blue,[4] indicates that DSs can refer only to well-established kinds, whereas this constraint does not hold for BSs, which may refer to kinds regardless of the lexical properties of the NP (noun or noun + modifier) they are built with.

Another observation made by Müller (2002) is that the BS is not possible in the object position of a kind predicate such as *inventar* ('to invent'), and *descobrir* ('to discover'), whereas the DS is allowed:

(14) a. * Graham Bell inventou telefone
Graham Bell invented telephone
b. * Alexander Fleming descobriu penicilina
Alexander Fleming discovered penicillin

(15) a. Graham Bell inventou o telefone
Graham Bell invented the telephone
b. Alexander Fleming descobriu a penicilina
Alexander Fleming discovered penicillin

3.2 BSs in BrP are like BPs in English

The differences between BSs and DSs illustrated above parallel similar differences between BPs and DSs in English. As reported in Krifka *et al* (1995), "bare plural NPs like *green bottles* and bare [mass] singular NPs like *gold which is hammered flat* (which do not refer to well-established kinds) can take generic readings, whereas DSs like *the*

[4]In section 6 below, we show that (13) can be interpreted generically in a context of comparison.

green bottle can only take an object reading" (1995: 11). Moreover, BPs cannot occur in the object position of *invent*-predicate; examples from Krifka *et al* (1995: 70):

(16) a. Shockely invented the transistor.
b. ??Shocke invented transistors.

4 Intensional maximal sums of individuals and atomic kinds

In this section, we will adopt the currently assumed analysis, according to which English BPs involve Chierchia's Down operator. Regarding the analysis of kind-referring DSs, we adopt Dayal's (2004) proposal that kind-referring DSs rely on an *iota* operator that applies to a property of kinds. Given this differentiated analysis, generic DSs and generic BPs in English (and more generally 'singular kinds' and 'plural kinds') can be viewed as referring to 'atomic kinds' (modeled as groups) and intensional maximal sums, respectively.

4.1 The down operator

According to Chierchia's analysis (1998: 351), kind-referring BPs are obtained via the Down operator, defined as an intensional iota operator that applies to a property of pluralities and yields the largest member of its extension (in a given world/situation):

(17) For any property P, world/situation s [and set of kinds K][5]

$$^{\cap}P = \begin{cases} \lambda s\, \iota\, P_s, \text{ if } \lambda s\, \iota\, P_s \text{ is in K} \\ \text{Undefined otherwise} \end{cases}$$

Where P_s is the extension of P in s.

Thus, a sentence such as (18a) has the logical form in (18b), where $^{\cap}$ Dogs denotes the sum of all the individual dogs in any possible world:

(18) a. Dogs are intelligent.
b. Intelligent ($^{\cap}$ Dogs)

Chierchia's down operator cannot account for kind-referring definite singulars, because by definition, this operator cannot apply to singular properties: "if P is a singular property (i.e., a property true of just singularities), ιP_w will necessarily be a singular

[5]In Chierchia (1998:350), K designates the ontological domain of kinds: "for simplicity's sake, let us assume that such individual concepts are members of the domain of individuals." The necessity of assuming a domain of kinds seems inconsistent with Chierchia's explicit rejection of an enriched ontology.

individual (when defined). Since kinds, as understood here, cannot have a singular instance in every world, '$\cap$' will not be defined for singular properties." (1998: 351).

4.2 The iota combined with a property of kinds

For kind-denoting definite singulars, we follow Dayal's (2004) proposal, in which these expressions rely on the standard *iota* operator. The difference between kind-referring and particular definite descriptions is due to the type of nominal predicate to which the *iota* operator applies: when applied to properties of objects, it returns a particular individual, and when applied to properties of kinds, it yields a kind. This analysis relies on an enriched ontology that contains kinds,[6] in addition to particular individuals, among the primitive entities of the domain.

According to Dayal, an important difference between particular individuals and kinds is that the domain of particulars is an unordered set, whereas kinds belong to a taxonomic hierarchy, ordered by the part-whole relation '$\leq$'. Thus, the singular noun *whale* refers either to particular individuals that are whales, assembled in an unordered set, or to the atomic kind WHALE, which is part of a taxonomic semi-lattice.

The *iota* operator has a uniqueness requirement that is satisfied if the set denoted by the nominal predicate is a singleton. For kinds, this requirement is that the domain of quantification does not include sub-kinds of the relevant type. The super kind is unique: it denotes the only taxonomic entity in the domain that has the whale property. Thus, the sentence *The whale is on the verge of extinction* is interpreted as (19a); the domain of quantification is the set of taxonomic entities, (19b), and the extension of the predicate *whale* is (19c):

(19) a. Be-on-the-verge-of-extinction (ιX [(whale (X)])
b. D = {DOG, LION, WHALE, MAN}
c. [[whale]] = {WHALE}

5 Back to Brazilian Portuguese: Number neutrality and the Down operator

No doubt, DSs in BrP behave exactly like DSs in English, and Dayal's proposal may cover both languages. But generic bare singulars cannot receive the same analysis for at least two reasons: (i) in all the languages that have an overt definite article, the *iota* must be overtly realized as a definite article; (ii) kind-referring bare singulars in BrP consistently behave unlike DSs and on a par with English BPs. The latter observation

[6]Because Chierchia refrained from enriching the ontology, he attempted to construct atomic kinds not as primitive entities in the domain, but rather as groups derived from mass-entities. For convincing criticism of Chierchia's analysis see Dobrovie-Sorin & Pires de Oliveira (2007).

strongly suggests that BSs in BrP should be analyzed as relying on the down operator. The problem is that Chierchia's down operator cannot, in principle, apply to BSs in BrP, because, at least superficially, BSs are singular, and by definition, the down operator cannot apply to singular properties. This problem is solved as soon as we recall that on their existential readings, BSs are number-neutral (Munn & Schmitt (1999)): since by Chierchia's (1998) own definition, the down operator can apply to any kind of predicate other than a predicate of singularities, nothing prevents it from applying to predicates that hold of both singularities and pluralities.

5.1 BSs in BrP are number neutral

For lack of space, we cannot review the evidence showing that existential BSs in BrP are number-neutral.[7] Let us merely illustrate this generalization by one example:

(20) a. Eu vi criança na sala
I saw child in-the room
b. E ela/elas estava/estavam ouvindo
and she/they was/were listening
'I saw a child/children in the room. And she was/they were listening.'

Sentence (20a) can be true in a situation in which there is one or more than one child in the room, which shows that the bare singular is unspecified for number. As pointed out by Munn & Schmitt (2005: 825), number neutrality is better indicated by the fact that the bare singular may be resumed with both a singular and a plural pronoun, as shown in (20b). Compare the bare plural, which can only be resumed with a plural pronoun.

It can also be shown that reference to mass entities has to be distinguished from number-neutral reference (contra Chierchia (1995, 1998)). In particular, bare mass nouns in BrP behave differently from count BSs (Munn & Schmitt (1999) and Müller & Paraguaçu (2007)). The difference between the two types of bare singulars can be characterized in terms of their respective denotational domains: the domain of mass nouns differs from that of count nouns insofar as it does not contain minimal parts (Bunt (1985), Landman (1989, 1991), Link (1989)); number-neutral count nouns, on the other hand, can be defined as denoting sets that contain both atoms and pluralities. This means that the count vs. mass distinction is a lexical distinction (which exists even in Chinese, as argued by Doetjes (1997) and Cheng& Sybesma (1999), contra Chierchia (1995, 1998)).[8] As to the morphosyntactic analysis, the 'null hypothesis' is that in the Lexicon, nouns (regardless of whether they are mass and count) are 'bare', i.e., they lack functional

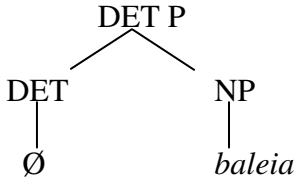
[7]See for instance Schmitt & Munn (2002), Müller & Paraguaçu (2007), among others.
[8]Doetjes (1997) showed that Chinese count nouns and mass nouns do not allow the same type of classifiers. Cheng & Sybesma (1999) were thus led to conclude, against Chierchia (1998), that the difference between Chinese and other languages cannot be stated as a semantic parameter regarding the type of noun, but rather as a morphosyntactic parameter regarding presence or lack of number morphology on nouns.

information such as Number or Determiner. In other words, all count nouns are number-neutral in the Lexicon, before the morphosyntactic category of Number is added to them (Munn & Schmitt (1999, 2005 among others). Singular and plural Number signal semantic operations over number neutral denotations: Singular Number suppresses all the pluralities in the set, maintaining only the atomic individuals, while Plural Number selects all the pluralities (Müller (2002), Müller & Paraguaçu (2007)). The presence of Number is not always visible to the naked eye: while in BrP, the suffix *–s* can be safely assumed to correspond to Plural Number, its absence does not necessarily correspond to Singular Number, but may also correspond to absence of the category of Number (interpretable as number neutrality). In BrP, and more generally in Romance languages, Singular Number is unambiguously signaled only on (indefinite or definite) articles and demonstratives.

5.2 The syntactic structure of BSs in BrP

Strictly speaking, a count 'bare singular' taken out of the Lexicon is not singular, but rather a 'bare NP', i.e., a nominal constituent that lacks Number. The parameter that separates BrP from the other Romance languages is that it allows a null Det to govern a bare NP, thus allowing BSs to occur in argument positions.[9] More concretely, we will follow Munn & Schmitt (1999) in assuming that in BrP, bare singulars are DPs headed by a null Det, with no NumP projection:[10]

(21)



A very similar proposal is found in Cheng & Sybesma (1999), who analyze Chinese bare nouns as Cl(assifer) Phrases headed by a null Cl that governs an NP. Given Munn & Schmitt's (1999, 2005) analysis, BrP and Chinese BSs share the option of not projecting the functional category of Number, but they differ insofar as in BrP, Number may be projected when Det is null (this is the case with BPs) and must be projected when Det is overtly realized as a definite article.

5.3 Number-neutral existential readings and the Down operator

In the configuration in (21), the count NP is not governed by Num, and as such it denotes a number-neutral property, to which the null Det applies. The function denoted by a null

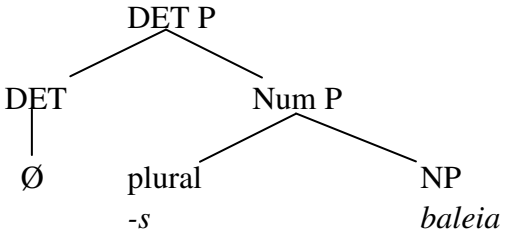
[9]In the other Romance languages, e.g., Spanish, Romanian and possibly also Italian, BSs show a highly restricted distribution, which arguably indicates that in these languages BSs are not DPs, as in Br P, but rather pseudo-incorporated bare NPs (Dobrovie-Sorin *& alii* (2005, 2006)).

[10]Since Agr(eement) is not relevant here and because we want to stay neutral as to whether it heads its own syntactic projection or not, this functional head does not appear in (21).

Det that applies to number-neutral properties depends on the context: in existential contexts, the null Det denotes a choice function (Reinhart (1997), Winter (1997)) that yields a number-neutral entity; in generic contexts, it is interpreted as a Down operator. Although Chierchia does not extend the application of the Down operator to number neutral domains (nor to mass domains),[11] such an application comes for free, given his own definition of the down operator: since this operator picks up the maximal sum in a given domain, it is irrelevant whether the domain contains atoms, in addition to pluralities. Similarly, if the Down operator applies to domains that contain amounts of matter (as is the case for bare mass nouns), it yields the maximal intensional amount in the domain. Thus, mass, plural and number-neutral BNs show a three-way distinction for their existential readings, but are alike in generic contexts, where they yield names of kinds in exactly the same way, as the result of the application of the down operator. Although this analysis of kind-referring BSs in BrP seems straightforward, it was not proposed by Munn & Schmitt (2005). To the best of our knowledge, Cheng & Sybesma (1999) is the only place where the analysis proposed here was suggested *in passing*: unlike lexical Cls, which have an individualizing function, the null Cl has – according to Cheng & Sybesma - only a 'deictic' function, i.e., it is a type-shifting operator that applies to a property and yields a non-individualized entity, e.g., a random amount of matter, a random number-neutral sum of individuals or an intensional maximal sum (i.e., a name of kind).

Our analysis directly explains why generic BSs in BrP behave on a par with generic BPs in English: just like BPs, they denote intensional maximal sums. Compare DSs which, in both English and BrP, denote atomic/taxonomic kinds obtained via an iota operator. English BPs differ from BSs in BrP insofar as Number is projected :

(22)



The difference in syntactic structure between BPs in English and BSs in BrP yields different readings in existential contexts: whereas BSs in BrP may refer either to a plurality or to an atom, BPs in English can refer only to pluralities. In a generic context, however, no difference in interpretation arises, because the Det-position is filled by the Down operator, yielding the maximal sum in the domain, regardless of whether the domain contains atoms or not.

[11]Chierchia wrongly assimilates number-neutrality and mass denotation (for arguments against such an identification, see Doetjes (1997) and Cheng & Sybesma (1999) for Chinese and Munn & Schmitt (2005) and Müller & Paraguaçu (2007) for BrP) and proposes that mass/number-neutral BNs directly denote kinds, without recourse to the Down operator.

6 Explaining the differences between BSs and DSs in BrP

In this section, the restrictions on kind-referring DSs are shown to follow as consequences of the hypothesis that these expressions denote atomic kinds, which belong to a taxonomy of kinds. The notion of 'well-established kind' is dispensed with and its empirical coverage is explained in terms of atomic kinds. In order to account for the fact that BPs cannot occur in the object-position of *invent*-type verbs we distinguish kinds from prototypes: DSs can refer to both, whereas BPs in English and BSs in BrP can only refer to kinds (viewed as intensional maximal sums).

6.1 'Well-established' kinds

As in English, kind-referring DSs in BrP seem to require reference to 'well-established kinds'. Thus, sentence (24) is unacceptable as a generic statement about the kind, because there is no well-established bricklayer kind. (23) is fine, because *o homem* ('the man') belongs to the well established class that contains, *inter alia,* MAN, DOG,… :

(23) O homem é inteligente
the man is intelligent
'The man is intelligent.'

(24) * O pedreiro é inteligente
the bricklayer is intelligent
'The bricklayer is intelligent. '

Since BSs refer to intensional maximal sums, which can be built from any kind of plural or number-neutral expression, there is no need for the existence of a 'well-established' kind. This explains why kind-referring BSs are not sensitive to the well-established-kind constraint:

(25) Pedreiro é preguiçoso
bricklayer is lazy
'Bricklayers are lazy.'

6.2 Contrastive sets

Let us now observe that (24) becomes acceptable if the common noun bears contrastive focus, as in (26) (capital letters indicate that the expression is focalized), or if it is in an explicitly contrastive environment, as in example (27):

(26) O PEDREIRO é inteligente
the bricklayer is intelligent
'The BRICKLAYER is intelligent. '

(27) O pedreiro, e não o construtor, é inteligente
the bricklayer, and not the builder is intelligent
'The bricklayer, not the builder, is lazy.'

These examples are acceptable because contrastive focus and explicit contrast are means of contextually supplying a taxonomy of kinds: the bricklayer is contrasted with another 'kind', building a 'taxonomy'. The facts observed here can be subsumed under Kay's (1971) proposal that an entity qualifies as a sub-kind, if and only if it belongs to a contrast set. Since a contrast set can be contextually provided, any common noun is expected to denote an atomic kind, given an appropriate context.

Insofar as it has any empirical content, the restriction to 'well-established kinds' follows as a consequence of the necessity of a taxonomy: in the absence of context manipulation, the required taxonomy is part of the Lexicon of a given language.

6.3 Intersective vs. Classifying Modifiers

The examples below, which contain DSs built with modified nouns, show that the existence of a contrast set is not sufficient for a DS to be able to refer to a kind: blue bottles contrast with non-blue bottles, just as Coca Cola bottles contrast with non-Coca Cola bottles:

(28) A garrafa de Coca-Cola tem gargalo estreito
the bottle of Coca Cola has neck narrow
'The Coca Cola bottle has narrow neck. '

(29) # A garrafa azul tem gargalo estreito
the bottle blue has neck narrow
'The blue bottle has narrow neck.'

There is, however, an important difference between the way in which the relevant contrast sets are built. The division between blue and non-blue bottles is obtained by putting together the objects that are both bottles and blue (i.e., the meaning of *blue bottle* is built of two intersective object-level properties). Compare the class of Coca Cola bottles: it includes all the objects that are Coca Cola bottles, but in this case the Coca Cola property cannot be viewed as an intersective property of objects: it does not mean 'containing Coca Cola', it does not even mean 'object designed for containing Coca Cola',[12] because it cannot apply to objects in general, but only to bottles. In other words, a modifier that belongs to a DP that refers to an atomic kind is a classifying rather than an intersective property.

[12]These observations were inspired by Beyssade's (2006) following remark: well-established manufactured kinds refer to a class of objects defined by other properties than being a bottle and containing Coca Cola. Analyzing the same type of example in French, she argues that *bouteille de Coca-Cola* 'Coca Cola bottle' is not compositionally understood, precisely because it refers to a kind.

6.4 Kinds vs prototypes

As Beyssade (2005) suggests for the corresponding French example built with a definite plural, the unacceptability of (14a), **Graham Bell inventou telephone* 'Graham Bell invented telephone', is due to the fact that the BS *telefone* 'telephone' denotes the maximal sum of telephones, and it is not possible to invent a sum of individuals, but only the prototype (an atomic individual), hence the acceptability of DSs. The same reasoning accounts for the impossibility of English BPs to appear as objects of *invent*.

But why is it that the passive is fine (the same happens in English), as shown by example (4), *Computador foi inventado por Babbage* 'Computer was invented by Babbage'? In the subject position of a passive sentence *computador* ('computer') is the topic of the generalization. This is a characterizing sentence that attributes the stable property of having-been-invented-by-Babbage to the kind/intensional maximal sum of computers and the sentence is acceptable because this property is relevant for the history of the kind. Compare the example in (14a): because the BS occupies the direct object position, it cannot function as a Theme, and therefore, this example cannot be analyzed as a characterizing sentence about the kind telephone, but only as an episodic sentence referring to the particular event of inventing a prototype.

7 Conclusion

Kind-referring DSs denote primitive entities in an enriched ontology. The label 'taxonomic kind' introduced by Dayal points to the fact that such primitive entities are classes that belong to a taxonomy of classes rather than classes built by putting together all the objects that have in common object-level properties (be they simple or complex properties, obtained by intersecting several object-level properties), which is the way in which kind-reference is obtained via the Down operator. It should be stressed that the ontological notion of 'primitive/taxonomic kind' is strictly correlated to a certain type of nominal expression: the *iota* operator applies to an NP that refers to a property of kinds and any modifier embedded inside the NP denotes a classifying rather than an intersective property. If the language is manipulated in such a way that a given NP or a given nominal modifier satisfies these conditions, reference to a primitive/taxonomic kind will be allowed. This means that the notion of 'primitive/taxonomic kind' should not be viewed as a language-independent ontological notion: primitive kinds are not given out-there, but are language-dependent. In other words, the language creates rather than reflects its ontology.

Kind-referring BSs denote intensional maximal sums, obtained by applying the down operator to a number-neutral domain, i.e., a domain that contains both atomic and plural objects. In this case, then, the common noun denotes a property of objects (rather than a property of kinds, as is the case with DSs, which refer to primitive kinds), which explains

why the generic use of bare singulars does not require a taxonomy of kinds. The fact that the Down operator can apply to a number-neutral property, which has gone unnoticed in the previous literature (with the notable exception of Cheng & Sybesma (1999)), follows from its very definition: since the down operator picks up the maximal sum in the lattice, it is irrelevant whether the lattice contains atoms in addition to pluralities/sums. In sum, the down operator is free to apply not only to plural properties (as in Chierchia (1995, 1998)), but also to mass properties (as in Dayal (2004)), and to number-neutral properties.

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Intermediate Scope Readings as Embedded Speech Acts *

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Abstract

In this paper we explain the variation in availability of (exceptionally wide) *intermediate scope readings* (ISRs). We argue that ISRs have to be kept apart from functional readings and provide a formal analysis of ISRs. Our approach is based on the assumption that exceptional wide scope readings are the effect of interpreting the involved indefinite as aboutness topic, where the introduction of an aboutness topic is analyzed as a distinct speech act, similar to an act of referring. We adopt this view and show that intermediate scope readings only occur in the presence of certain topic-comment embedding operators.

1 Introduction

Nowadays the observation that indefinites can take exceptional wide scope out of scope islands is well-known. In example (1) from (Ruys, 1999) the indefinite *three relatives of mine* can take *exceptionally wide* scope outside the *if*-clause-island, yielding a reading roughly paraphrasable as *there are three relatives of mine and if all of them die, I will inherit a fortune.*

(1) *If three relatives of mine die I will inherit a fortune.* [IF $\succ$ 3] [3 $\succ$ IF]

If indefinites can escape scope-islands and take scope wherever they please, one would expect to see them take *intermediate scope*, i.e. scope outside a scope-island but yet below other scope-taking operators. However, this does not seem to be the case, as

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(Fodor and Sag, 1982) argue. They provide (2) as an example where the indefinite *a student* cannot take exceptional wide scope outside the *if*-clause-island but below *every professor* (b) , although it can take (exceptional) widest scope (c).

(2) *If a student in the syntax class cheats on the exam, every professor will be fired.*

a. [$\forall$ professor $\succ$ IF $\succ$ $\exists$ student]	narrow scope	available
b. [$\forall$ professor $\succ$ $\exists$ student $\succ$ IF]	(exceptional) intermediate scope	unavailable
c. [$\exists$ student $\succ$ $\forall$ professor $\succ$ IF]	(exceptional) widest scope	available

This observation led Fodor and Sag (1982) to propose that indefinites are ambiguous between a quantificational and a referential reading, thus accounting for the observed narrow scope and widest scope reading, respectively. This proposal also makes the prediction that intermediate scope readings are unavailable in general, a view to which Fodor and Sag (1982) subscribe.

However, sometimes intermediate scope readings (ISRs) *are* available. In the following example from (Ruys, 1992) the indefinite contains a bound pronoun such that a widest scope reading is unavailable for binding reasons. But more crucially, this bound pronoun seems to make an intermediate scope reading available.

(3) *Every professor$_i$ will rejoice if a student of his$_i$ cheats on the exam.*

Indeed this observation has led some researchers to conclude that the presence of an overt or covert bound pronoun is the decisive indicator for an intermediate scope reading (cf. Matthewson, 1999; Schwarzschild, 2002). But there are yet examples which show that intermediate scope readings are also available in cases where the indefinite does not contain such a bound pronoun. The following is a case in point from (Kratzer, 1998). (4) also has an intermediate scope (*de re*) reading stating that for everyone of them there is a doctor from the hospital such that he suspected that this doctor is a quack.

(4) *Everyone of them suspected that some (actual) doctor from the hospital was a quack.*

In conclusion, Fodor & Sag's claim that intermediate scope readings do not exist in general has to be dimissed (cf. e.g. Farkas, 1981; Ruys, 1992; Abusch, 1994; Kratzer, 1998, and many others). But then again, it is not the case that ISRs do exist in general as Fodor & Sag's seminal (2) shows. Even if the intermediate scope reading is contextually preferred it seems to be unavailable in certain cases, rendering sentences pragmatically odd:

(5) *(Last week, I went to a horse-race every day. It was curious:)*
$^{\#}$*All horses won all races that took place on some day.*

[$\forall$ horse $\succ$ $\forall$ race $\succ$ $\exists$ day]	narrow scope	contextually excluded
[$\forall$ horse $\succ$ $\exists$ day $\succ$ $\forall$ race]	intermediate scope	unavailable
[$\exists$ day $\succ$ $\forall$ horse $\succ$ $\forall$ race]	widest scope	contextually excluded

In (5), the narrow scope and the widest scope reading of the indefinite *some day* is contextually excluded. As every competition usually yields only one winner it is implausible that all horses won all races, whether they happen on some day or other (narrow scope

reading) or at some specific day (widest scope reading). The only sensible reading would be the ISR, paraphrasable as *for each horse there was one day such that this horse won all races on that day*. However, this reading does not seem to be available in the case of (5) resulting in the observed oddity.

The most pressing question raised by these data is obviously: what exactly is it, that is responsible for the (un)availability of ISRs? In this paper we provide an answer to this question that recurs to the information structural notion of *topicality*. We follow Ebert and Endriss (2004) and Endriss (to appear) who propose a formal interpretation of the notion of *aboutness topicality* (Reinhart, 1981) for clauses structured into topic-comment which separates the establishment of the topic from the predication of the comment. Crucially, topic establishment is prior to the predication of the comment thus resulting in a (possibly exceptional) wide scope reading of the topical constituent w.r.t. all operators included in the comment. We extend this approach and show that ISRs may arise if such a topic-comment structured clause occurs embedded within some operator. Hence ISRs are predicted to be unavailable if no such embedding operator is present, which we will show to be borne out.

We start with a careful inspection of the data in Section 2 and argue that it is crucial to keep genuine ISR apart from wide scope *functional* readings. After a brief exposition of the approach of Ebert and Endriss (2004) and Endriss (to appear) our own formal approach follows in Section 3. We conclude with a brief discussion on the nature of speech act embedding operators in Section 4.

2 Intermediate Scope vs. Functional Wide Scope

We will first take a closer look at data that illustrate important differences between genuine intermediate scope readings and functional wide scope readings. In order to elucidate the respective readings, we will investigate possible continuations of a given scope-ambiguous sentence.

The inspection of continuation possibilities has been used in various other contexts in order to elucidate and differentiate functional and pair-list readings, for instance with questions (Groenendijk and Stokhof, 1984; Krifka, 2001) and functional relative clauses (Sharvit, 1997). The following example is taken from (Krifka, 2001).

(6) *Which dish did every guest make?*
   a. *Pasta.*
   b. *His favourite dish.*
   c. *Al, the pasta; Bill, the salad; ...*

(7) *Which dish did most/few guests make?*
   a. *Pasta.*
   b. *Their favourite dish.*
   c. *# Al, the pasta; Bill, the salad; ...*

In (6) both a functional (b) as well as a pair-list answer (c) are possible (in addition to an individual answer). This is different from (7), where a pair-list answer is inappropriate, while a functional (and individual) answer is still fine. Hence pair-list answers are more restricted than functional answers and must be distinguished from the latter.

The proposal to use this method to distinguish different readings induced by quantifier scope variation has first been proposed by (Groenendijk and Stokhof, 1984) and employed in (Endriss, to appear; Ebert and Endriss, 2006). We will use this method in the following to tease apart functional readings and genuine intermediate scope readings.

Each sentence in the following pair contains the same three DPs with the indefinite *some lecturer* occurring in an *if*-clause-island. The decisive difference is the presence of the CP-embedding verb *announce* in (8b).

(8) a. *Every student will leave the party if some lecturer shows up.*
b. *Every student announced that she will leave the party if some lecturer shows up.*

Accordingly, we observe differences concerning the acceptability of different continuations. Whereas the statement of an individual and the statement of a functional dependence yields a felicitous discourse in both cases, an enumeration of student-lecturer pairs is acceptable only subsequent to (8b).

(9)

Continuation	OK after (8a)?	OK after (8b)?
Namely, Prof. Humpty (statement of individual)	yes	yes
Namely, her supervisor (statement of functional dependence)	yes	yes
For Ann its Prof. Hob, for Mary Prof. Nob, ... (pair list)	**no**	yes

We take it that these three different types of continuations correspond to different scope readings of the indefinite *some student*. The statement of an individual helps to elucidate the widest scope reading, the statement of a functional dependence a *functional wide scope reading*, and the enumeration of pairs a genuine intermediate scope reading. Hence we conclude from (9) that both sentences in (8) allow for a widest scope/functional wide scope reading, while only (8b) allows for a genuine ISR.

That functional wide scope readings and genuine ISRs are truth-conditionally independent can be illustrated with examples including non-monotonic quantifiers like the following variant of (8b) (cf. Chierchia, 2001; Schwarz, 2001; Endriss, to appear)

(10) *Exactly two students announced that they will leave the party if some lecturer shows up.*

Both a function statement as well as a pair-list enumeration are acceptable continuations for (10). The functional wide scope reading and the genuine intermediate scope reading are given schematically in (a) and (b), respectively.

(11) a. $\exists f_{\rightarrow \text{lecturer}}[|\lambda x[\mathsf{student}(x) \wedge \mathsf{announce}(x, \mathsf{shows\_up}(f(x)) \rightarrow \mathsf{leave}(x)]| = 2]$

There is a function into lecturers such that the number of students who announced that they leave if the functionally corresponding lecturer shows up is 2.

b. $|\lambda x[\mathsf{student}(x) \wedge \exists y[\mathsf{lecturer}(y) \wedge \mathsf{announce}(x, \mathsf{shows\_up}(y) \rightarrow \mathsf{leave}(x)]]| = 2$

> The number of students such that there is a lecturer such that the students announced that they leave if this lecturer shows up is 2.

These two readings differ in truth conditions. Suppose Ann, Bob, and Chris are students who announced to leave the party if Mr. Annson, Mr. Bobson, and Mr. Chrisson shows up, respectively. Furthermore, Mr. Annson and Mr. Bobson happen to be the respective supervisors of Ann and Bob, but Mr. Chrisson is just some lecturer Chris despises. In this situation the functional wide scope reading in (11a) is true: there is a function of the required kind, namely the one assigning the supervisor to each student. However, the ISR in (11b) is false: the overall number of students who made announcements with regards to respective lecturers is not two, but three.

We conclude that functional wide scope readings and ISRs must be kept apart and hence must be analyzed differently. While in the case of the former an indefinite is interpreted as a function that takes widest scope, an ISR must be analyzed such that the indefinite genuinely takes intermediate scope between two other scope operators. We argue in (Ebert and Endriss, 2006) that functional wide scope readings exist whenever an ordinary wide scope reading exists and the indefinite can plausibly be reinterpreted as a function, for instance due to the presence of a pronoun or some inherent relational meaning as in the case of nouns like *relative*, *teacher*. Genuine ISRs on the other hand are much more restricted as examples like (8a) illustrate.

In the following we will not go into any more detail on functional wide scope readings, but refer the reader to (Ebert and Endriss, 2006) where they are discussed in depth. Instead we will focus on intermediate scope readings and the aspects that restrict their occurrence.

3 Intermediate Scope Readings via Embedded Topics

We base our proposal for the derivation of intermediate scope readings on (Ebert and Endriss, 2004; Endriss, to appear), where the information structural notion of *aboutness topicality* is the decisive aspect for the existence of *exceptional* wide scope readings, i.e. scope readings where it seems that scope islands are not respected.

3.1 Embedded Topics

In fact, the observation that topical indefinites receive a wide scope/specific/referential interpretation has been made at various places before (cf. Firbas, 1966; Cresti, 1995, and many others). (Ebert and Endriss, 2004; Endriss, to appear) understand topics as sentence topics in the *aboutness* sense of (Reinhart, 1981). According to Reinhart's view (which goes back to Hockett 1958), topics constitute what the sentence is about. They refer to an *individual/'storage address'* associated with the information conveyed by the sentence.

Topic-marking, i.e. designation of a constituent as topic subdivides a clause into topic and

comment. This division is captured formally with a *structured meaning* representation (cf. Dahl, 1974; Krifka, 1992), i.e. a pair of semantic representations such that the first and second component reflect the semantic contributions of the topic and the comment, respectively. The rules for the compositional derivation of these structures are defined in a way such that the semantics of the comment can be applied to the semantics of the topic at any stage, resulting in the 'standard' compositional semantics of the respective constituent. We note topic-comment structures in the following form (see (Krifka, 1992) for details on the formal definition and compositional derivation of such structures).

(12) $$[\varphi]_{\text{Topic}}\ [\lambda x[\psi(x)]]_{\text{Comment}}$$

(Endriss, to appear) assumes that topic-comment structured clauses are always embedded under some operator. In the 'standard' case, where the topic-comment structure exhausts the entire matrix clause, this embedding operator is a silent speech act operator such as ASSERT (Jacobs, 1984) for instance. Crucially, topics can also occur embedded. This case can occur if the sentence contains subordinate clauses that are themselves structured into topic and comment. Take for instance a CP complement verb such as *announce* in

(13) *Peter announced that John will marry Sue.*

If we take the three DPs as candidates for topic marking, there are various possibilities. First, in the 'standard' case, either DP might be the topic of the entire utterance or, more precisely, the speech act. For instance if *John* constitutes the topical constituent in this way, the entire speech act would be an assertion about John, about whom it is asserted that Peter announced that he will marry Sue. This is reflected in the structured meaning representation that we derive for the assertion of (13).

(14) $$\mathsf{ASSERT}\big([\mathsf{john}]_{\text{Topic}}[\lambda x[\mathsf{announce}\big(\mathsf{peter}, \mathsf{marry}\big(x, \mathsf{sue}\big)\big)]]_{\text{Comment}}\big)$$

Second, each DP of the embedded CP (i.e. *John* and *Sue*) might be the topic of the embedded clause. If *John* constitutes the topical constituent in this way, the 'aboutness' of John would not concern the speech act but the announcement. The entire utterance is then interpreted as an assertion stating that Peter makes an *announcement about John*, namely that he will marry Sue.

(15) $$\mathsf{ASSERT}\big(\mathsf{announce}\big(\mathsf{peter}, [\mathsf{john}]_{\text{Topic}}[\lambda x[\mathsf{marry}(x, \mathsf{sue})]]_{\text{Comment}}\big)\big)$$

Obviously, not every CP complement verb allows for such an aboutness interpretation and hence for topic-comment structured complements. We will discuss the class of verbs that do allow such structured complements in Section 4. But in the presence of a suitable CP embedding semantic operator (such as *announce*) we are confronted with one of the following situations, depending on the exact form of the topic-comment structure.

(16) a. $\mathsf{SpeechActOperator}([\ldots]_{\text{Topic}}[\ldots \mathsf{SemanticOperator}(\ldots)\ldots]_{\text{Comment}})$

b. $\mathsf{SpeechActOperator}(\ldots \mathsf{SemanticOperator}([\ldots]_{\text{Topic}}[\ldots]_{\text{Comment}})\ldots)$

The schema in (16a) corresponds to (14), where the topic-marked constituent contributes the 'outermost' topic of the entire speech act, i.e. the object the speech act is about. The schema in (16b) on the other hand corresponds to (15), where the topic-marked constituent contributes the 'embedded' topic of a clausal argument of some semantic operator, i.e. the object the semantic contribution of this operator is about.

In the following section we formalize the notion of aboutness topicality and put forth a general topic interpretation scheme that details how topic-comment structures are interpreted w.r.t. their embedding operators. Crucially, this general scheme will eventually derive widest scope readings of the topical constituent for structures of the form (16a) and intermediate scope readings for structures of the form (16b). Hence, we predict that the presence of a suitable topic-comment structure embedding semantic operator such as *announce* is crucial for the derivation of intermediate scope readings.

This approach is similar in spirit to the proposal of Kratzer (1998). In her view, genuine intermediate scope readings (which need to be distinguished from functional wide scope readings, as Kratzer also concedes) constitute *de re* readings in the context of attitude verbs (such as *suspect*), which come with an additional *res* argument. Furthermore she assumes that some indefinites come with existence presuppositions, which can be accommodated into the res argument of the attitude verb if the indefinite occurs in the scope of such a verb. Hence, the availability of ISRs hinges on the presence of a corresponding attitude verb.

3.2 Topic Interpretation

(Ebert and Endriss, 2004; Endriss, to appear) propose to formalize the concept of *'storage address'* in Reinhart's aboutness metaphor by a *discourse referent* in the semantic representation which is used further in predication of the information in the comment. They assume that all DPs (including indefinites) denote generalized quantifiers following Kadmon (1985) w.r.t. to the lexical quantifier semantics. For instance, the semantic contribution of the indefinite DP *three lecturers* would be the following.

(17) $$[\![\textit{three lecturers}]\!] = \lambda Q.\exists X[\,|X| = 3 \wedge X \subseteq \mathsf{lecturer} \cap Q\,]$$

As a generalized quantifier does not *per se* provide a reasonable storage address, i.e. a discourse referent, such a discourse referent must be created for a suitable representative of the generalized quantifier, if the respective quantified DP is marked for topicality. A *minimal witness set* of the quantifier is such a suitable representative (cf. Szabolcsi, 1997). Minimal witness sets as defined in (Barwise and Cooper, 1981) are those sets of a GQ that, roughly speaking, contain no 'unnecessary' elements. The set of such minimal witness sets of a GQ G can be defined as follows:

(18) $$\mathsf{MinWit}(G) =_{\text{def}} \{\, X : G(X) \wedge \forall Y[G(Y) \rightarrow \neg(Y \subset X)] \,\}$$

For instance, $\mathsf{MinWit}([\![\textit{three lecturers}]\!])$ comprises all sets that consist of exactly three lecturers.

(19) $$\mathsf{MinWit}([\![\textit{three lecturers}]\!]) = \{\, X \subseteq \mathsf{lecturer} : |X| = 3\}$$

According to this view of the aboutness concept, the basic interpretation scheme for a topic-comment structure $[G]_{\text{Topic}}\ [\lambda\mathcal{G}[\psi(\mathcal{G})]]_{\text{Comment}}$ is formally spelled out in two steps, where we make crucial use of a *dynamic* construal of the involved quantifiers and logical connectives along the lines of e.g. (Groenendijk and Stokhof, 1991).

1. A new discourse referent (i.e. 'storage address') for a minimal witness set representative of the topic G is introduced.

   (20) $$\exists X[X \in \mathsf{MinWit}(G)]$$

2. This representative stands proxy for G in the application of the comment. Hence the comment is interpreted as a predicate that applies to (the representative of) the topic:

   (21) $$\psi(X)$$

   where the type mismatch of X (of set type) with the argument $\mathcal{G}$ of ψ (of generalized quantifier type) is resolved by a distributive type lift of X to $\lambda P[X \subseteq P]$.

The *Topic Interpretation Scheme* relates these two steps to the operator which embeds the topic-comment structure as explained above. It reflects the natural order that is suggested by the aboutness concept: first, the object which the sentence is about is established, and *then* the sentence conveys further information about this object. That is to say that the establishment of the topic is assumed to happen *before* the predication of the comment. In formal terms, the introduction of the discourse referent (20) happens *outside* of the topic-comment structure embedding operator, while the predication of the comment (21) stays inside.

(22) **Topic Interpretation Scheme:**

If $[G]_{\text{Topic}}[\lambda\mathcal{G}[\psi(\mathcal{G}]]_{\text{Comment}}$ is a topic-comment structure and $\mathcal{O}$ is the embedding operator, then

$$\mathcal{O}\big([G]_{\text{Topic}}[\lambda\mathcal{G}[\psi(\mathcal{G}]]_{\text{Comment}}\big)$$

is interpreted as

$$\exists X[X \in \mathsf{MinWit}(G)] \wedge \mathcal{O}\big(\psi(X)\big)$$

In cases the topic is the 'outermost' topic of the matrix clause (as exemplified by the schema in (16) and instantiated by (14)), a speech act operator plays the role of $\mathcal{O}$ in the Topic Interpretation Scheme (22). Applying the interpretation scheme straightforwardly would yield the following result

(23) $$\exists X[X \in \mathsf{MinWit}(G)] \wedge \mathsf{SpeechActOperator}\big(\psi(X)\big)$$

This representation is not very sensible as such, as it consists of a conjunction of semantic material (the existential quantification of a new discourse referent for the witness representative) with material on the speech act level. Therefore we re-interpret the first part as a separate *speech act of topic establishment* very similar to an act of *referring* (cf. Searle, 1969) or *frame setting* (cf. Jacobs, 1984) (with the additional introduction of a

new discourse referent). We write $\mathsf{REF}_X(G)$ for this speech act and take it to mean that the speaker establishes an aboutness topic for a subsequent speech act by introducing a new discourse referent X for a minimal witness set of G. With this re-interpretation (23) becomes

(24) $$\mathsf{REF}_X(G) \quad \& \quad \mathsf{SpeechActOperator}\big(\psi(X)\big)$$

where we write & for speech act conjunction, i.e. consecutive performance of speech acts. Performance of these two consecutive acts leads to the following consecutive update of the common ground, where $c + \varphi$ indicates the update of the common ground c with φ.

(25) $$c \quad + \quad \exists X[X \in \mathsf{MinWit}(G)] \quad + \quad \text{effects of } \mathsf{SpeechActOperator}\big(\psi(X)\big)$$

Note that due to the initial topic establishment, the topic G in effect takes scope over any other scope-taking element in the comment ψ. This is the crucial feature that allows for the derivation of exceptional wide scope readings of indefinites. Consider (1) again, repeated here as (26), where the indefinite occurs in a scope island.

(26) *If [three relatives of mine]$_T$ die I will inherit a fortune.*

If this assertion is about the *three relatives of mine* mentioned in the antecedent (i.e. if the topic is marked as indicated) the structured meaning representation would be as follows (where we simplify exposition by not fully spelling out the formal representation here and in the following).

(27) $$\mathsf{ASSERT}\big(\big[\ [\![\textit{three relatives of mine}]\!]\ \big]_{\text{Topic}}\big[\ \lambda\mathcal{G}.\mathcal{G}[\lambda y.\mathsf{die}(y)] \rightarrow \mathsf{inherit}(I)\ \big]_{\text{Comment}}\big)$$

According to the Topic Interpretation Scheme (22) this representation would be interpreted by the two consecutive acts in (29).

(28) $$\mathsf{REF}_X([\![\textit{three relatives of mine}]\!]) \quad \& \quad \mathsf{ASSERT}(X \subseteq \mathsf{die} \rightarrow \mathsf{inherit}(I))$$

If we simplify matters somewhat and assume that the common ground update effect of an assertion is simply the addition of the asserted proposition to the common ground, the final common ground update of these two acts is as follows:

(29) $$c \quad + \quad \exists X[|X| = 3 \wedge X \subseteq \mathsf{rel\_of\_mine}] \quad + \quad (X \subseteq \mathsf{die} \rightarrow \mathsf{inherit}(\mathsf{speaker}))$$

This corresponds to the exceptional wide scope reading of the indefinite *three relatives of mine* in (26). The common ground is updated with the information that there is a set of three relatives of the speaker such that she inherits a fortune if they die altogether. Note that in order for this reading to emerge, it is crucial that the indefinite constitutes the aboutness topic of the sentence. If it was not, the approach would predict only local scope variation confined to scope-islands as usual. Exceptional wide scope emerges if and only if the respective indefinite is interpreted as topic in the way detailed above.

3.3 Intermediate Scope Readings

In order to show the semantic effect of interpretation of embedded topic-comment structures, we recur to (8) again.

(30) a. *Every student will leave the party if some lecturer shows up.*

b. *Every student announced that she will leave the party if some lecturer shows up.*

Both sentences contain the indefinite *some lecturer* as part of an *if*-clause-island, but only (30b) contains the CP embedding verb *announce*.

Consider an assertion of (30b). As mentioned before, the only possibility for an exceptional wide scope interpretation of *some lecturer* lies in its status as aboutness topic and hence we assume that it is marked as such. Depending on whether the corresponding topic-comment structure exhausts the entire sentence or only the embedded CP, a representation of an assertion of (30b) patterns with the schemata (16a) and (16b), respectively.

Suppose first that the indefinite is the matrix level topic and hence the topic-comment structure exhausts the entire sentence (illustrated as follows where the comment is underlined for clarity):

(31) *Every student announced that she will leave the party if [some lecturer]$_T$ shows up.*

In this case, the topic-comment structure representation is an instance of the schema in (16a).

(32) $\mathsf{ASSERT}\Big(\big[\ [\![\textit{some lecturer}]\!]\ \big]_{\text{Topic}}$
$\big[\lambda\mathcal{G}[\forall x[\mathsf{student}(x) \rightarrow \mathsf{announce}(x, \mathcal{G}(\mathsf{show\_up}) \rightarrow \mathsf{leave}(x))]]\big]_{\text{Comment}}\Big)$

The Topic Interpretation Scheme derives the following interpretation.

(33) $\mathsf{REF}_X\big([\![\textit{some lecturer}]\!]\big)$
$\&\ \mathsf{ASSERT}\Big(\forall x[\mathsf{student}(x) \rightarrow \mathsf{announce}(x, X \subseteq \mathsf{show\_up} \rightarrow \mathsf{leave}(x))]\Big)$

The eventual common ground update illustrates that this is the exceptional widest scope reading for the indefinite: there is a certain lecturer such that every student announced that he leaves if this lecturer shows up.

(34) $c \quad + \quad \exists X[|X| = 1 \ \wedge\ X \subseteq \mathsf{lecturer}]$
$\quad + \quad \forall x\big[\mathsf{student}(x) \rightarrow \mathsf{announced}\big(x, X \subseteq \mathsf{show\_up} \rightarrow \mathsf{leave}(x)\big)\big]$

The derivation of this widest scope reading is not any different from the derivation illustrated in (26) – the indefinite functions as the 'outermost' topic of a matrix level topic-comment structure.

The more interesting case of (30b) occurs when the topic-comment structure is 'embedded' under the CP complement verb *announce*.

(35) *Every student* announced *that she will leave the party if [some lecturer]$_T$ shows up.*

In this case, the structured representation instantiates (16b): the topic-comment structure is embedded under the semantic operator announce.

(36) $\mathsf{ASSERT}\big(\forall x\big[\mathsf{student}(x) \rightarrow \mathsf{announced}\big(x, \big[\ [\![\textit{some lecturer}]\!]\ \big]_{\text{Topic}}\ \big[\ \lambda\mathcal{G}[\mathcal{G}(\mathsf{show\_up}) \rightarrow \mathsf{leave}(x)]\ \big]_{\text{Comment}}\big)\big]\big)$

The Topic Interpretation Scheme in (22) applies again in the same way as before, but now the crucial operator $\mathcal{O}$ is the semantic operator announce instead of the speech act operator ASSERT as in the former cases. Hence, the establishment of the topic, i.e. the introduction of the discourse referent for a witness set representative, is not reinterpreted as a separate speech act but enters into the semantics proper.

(37) $\mathsf{ASSERT}\big(\forall x\big[\mathsf{student}(x) \rightarrow \exists X[X \in \mathsf{MinWit}([\![\textit{some lecturer}]\!])] \wedge \mathsf{announced}\big(x, X \subseteq \mathsf{show\_up} \rightarrow \mathsf{leave}(x)\big)\big]\big)$

In the final common ground update the asserted information is added to the common ground yielding

$c{+}\forall x\big[\mathsf{student}(x) \rightarrow \exists X[|X| = 1 \wedge X \subseteq \mathsf{lecturer}] \wedge \mathsf{announced}\big(x, X \subseteq \mathsf{show\_up} \rightarrow \mathsf{leave}(x)\big)\big]$

This is the genuine intermediate scope reading for the indefinite in (30b): for every student there is a (potentially different) lecturer such that this student has announced that she will leave the party if that lecturer shows up.

In contrast, consider (30a) and assume again that the indefinite *some lecturer* is marked for topicality. In this case, there is no choice as to how exactly the sentence may be structured into topic and comment. As it does not contain any CP complement verb and hence no topic-comment structure embedding operator, the only option is for the topic-comment structure to exhaust the entire sentence. Hence the topic interpretation runs entirely parallel to the corresponding interpretation (32)–(34) of matrix level topic for (30b). The eventual common ground update again amounts to an exceptional widest scope reading for the indefinite: there is a certain lecturer such that every student will leave if this lecturer shows up.

(38) $c \ + \ \exists X[|X| = 1 \ \wedge \ X \subseteq \mathsf{lecturer}] \ + \ \forall x\big[\mathsf{student}(x) \rightarrow X \subseteq \mathsf{show\_up} \rightarrow \mathsf{leave}(x)\big]$

Crucially, this is the only exceptional/island-free scope reading of the indefinite. In particular, there is no way to derive an intermediate scope reading due to the lack of any topic-comment embedding operator. This explains the contrast we observed in (9), where an intermediate scope reading was elicited by a viable pair-list continuation for (30a) but not for (30b).

The absence of a topic-comment embedding operator also accounts for the oddity of (5)

(39) *#All horses won all races that took place on a some day.*

As discussed in (5), this sentence lacks an intermediate scope readings despite its pragmatic preference for such a reading.

An ISR does become available in the presence of a topic-comment embedding operator such as *reported*:

(40) *Of all horses it was* reported *that they (had) won all races that took place on some day.*

Again, the availability of the ISR can be elicited by a pair list continuation of (40), which is impossible subsequent to (5).

(41) *Fury was the winner on Monday, Seabiscuit on Tuesday, ...*

Assuming that the indefinite *some day* is topic-marked, our approach derives a genuine intermediate scope reading if the corresponding topic-comment structure occurs embedded under *reported*: For each horse, there was some day such that it was reported that it had won all races that happened on that day.

In conclusion, genuine intermediate scope readings are only available in the presence of a topic-comment embedding operator. Hence we predict the following scope patterns:

no topic marking	→	local scope variation
topic marking at matrix level	→	(exceptional) wide scope
	→	(exceptional) functional wide scope (cf. Ebert and Endriss, 2006)
embedded topic marking	→	genuine intermediate scope

The data we presented in Section 1 confirm these predictions. The seminal example (2) of Fodor & Sag lacks an ISR due to the absence of any topic-comment embedding operator. For the same reason, (3) lacks a genuine ISR but has a very prominent *functional* wide scope reading due to the presence of the overt pronoun that could be easily mistaken for an ISR. And finally, (4) has a genuine ISR because of the presence of the topic-comment embedding operator *suspect*. Currently Cieschinger et al. (in preparation) are undertaking experimental studies which aim at further empirical verification of these predictions.

4 Topic-Comment Structure Embedding Operators

At this point, it is of obvious interest to know what kind of operators allow for embedding of topic-comment structures and what they have in common. We will only briefly discuss data from Japanese and German here and refer the reader to (Ebert et al., to appear) for more detail on these issues.

In Japanese some verbs allow for overt topical *wa*-marked *within their CP complements* (Kuroda, 2005).

(42) a. John wa Mori-san wa Toyota no syain de aru to omotte-iru.
John WA Mori-san WA Toyota of employee be that think-be

'John believes that Mori-san is an employee of Toyota.'

b. John wa Mori-san wa Toyota no hira-syain de aru koto o zannen ni
John WA Mori-san WA Toyota of flat-employee be that regret

omotte-iru.
think-be

'John regrets that Mori-san is a mere employee of Toyota.'

As is known, *wa*-marking may indicate topicality or contrastivity. Kuroda (2005) observes that (42b) only has a contrastive interpretation whereas in (42a) no such contrastive interpretation is enforced and concludes that (42a) but not (42b) constitutes a case of embedded topic-marking.

In German, *dass* complement clauses standardly occur in verb final word order.

(43) Mia glaubt/vermutet/kündigt an/berichtet/bedauert, dass Pit nach Hause **geht**.
Mia believes/suspects/announces/reports/regrets that Pit to home goes.

'Mia believes/suspects/announces/reports/regrets that Pit is going home.'

However, some verbs allow for V2 clauses in the same position, while others do not (see Truckenbrodt, 2006, and citations therein).

(44) Mia glaubt/vermutet/kündigt an/berichtet/*bedauert, Pit **geht** nach Hause.
Mia believes/suspects/announces/reports/regrets Pit goes to home.

'Mia believes/suspects/announces/reports/regrets that Pit is going home.'

Comparing the two verbs *believe* vs. *regret*, we see that the former allows for both embedded topical *wa*-marking and V2 embedding while the latter allows for neither. Preliminary questionnaire studies show that also other verbs such as *say* and *want* pattern with *believe* and *regret*, respectively[1]. Interestingly, the difference between *believe/regret* is also observable w.r.t. intermediate scope readings.

(45) a. *Every pupil believes that the outing will be called off if one teacher falls ill.*
b. *Every pupil regrets that the outing will be called off if one teacher falls ill.*

While a pair list continuation is possible for (45a) it is impossible for (45b). Hence, a genuine ISR is available for (45a), but not for (45b). Our conjecture at this point is that verbs that allow for embedded topical *wa*-marking in Japanese, verbs that allow for V2 complement clauses, and verbs that allow for intermediate scope readings form the same class.

It has been noted at several places that predicates that embed V2 show some resemblance to *assertions*. For instance, Gärtner (2002) argues that embedded V2 clauses have *assertive proto-force*. We conclude tentatively that the assertive character is the decisive feature for ISRs to arise. Assertions can be structured into topic (the object the assertion is about) and comment. Since V2 complements are assertive in character, they are likely candidates for embedded topic-comment structures and hence the verbs allowing for V2 complements are likely candidates for topic-comment embedding operators. The possible underlying generalization for topic interpretation could then be as follows.

Topics take scope over the (proto-)assertion they are embedded in.

[1]We are grateful to Yurie Hara, Shinichiro Ishihara, and Kimiko Nakanishi for their help.

If this assertion is the outermost speech act operator, a widest scope reading of the topic arises. If the assertion is embedded, a genuine ISR arises. And if the sentence contains no V2-complement verb that could possibly embed an assertion, an ISR is unavailable.

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Between "Cost" and "Default" of Scalar Implicature: the Cost of Embedding*

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Abstract

Two main points constitute a matter of debate concerning the phenomenon of Scalar Implicatures (SIs): the *place* of their derivation, which opposes a "recursive"/grammatically driven approach such as Chierchia's (Chierchia, 2002&2006; Fox, 2003; Landman, 1998; Levinson, 2000) to traditional Neo-Gricean approaches that view SIs as genuinely post-grammatical/pragmatic processes that are added "globally", independently of compositional semantics (Russell, 2006; Sauerland, 2005; Spector, 2003 a.o.); and the question of the processing *cost* of SI computation, which most of the experimental works on SIs have recently been focused on (Bott & Noveck, 2004; Breheny, Katsos, & Williams, 2005; Noveck & Posada, 2003). Orthogonal to this debate, our contribution is based on the assumption that SIs are derived locally (following Chierchia, 2006) and tests the effect of logical abstract properties of the context (e.g. monotonicity) on the computation of implicatures and their cost. Our main finding is that a "cost" is found only when implicatures are added despite the fact that they lead to a weakening of the overall assertion (namely, in Downward Entailing contexts): this loss in informativity, and not implicature computation *per se*, is interpreted as the source of this "cost".

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1 Introduction

Consider the example in (1):

(1) Lorenzo is singing *or* dancing

This sentence normally conveys the fact that its (more informative) alternative (2) doesn't hold. Hence (3), which is how (1) is normally interpreted:

(2) Lorenzo is singing *and* dancing

(3) Lorenzo is singing *or* dancing but not both

The Scalar Implicature added in (3) corresponds to the *exclusive* interpretation of "or" (A or B but not both), which contrasts with the *inclusive*/logical meaning of "or" (A or B or both). The mechanism by which SIs are derived is based on the notion of scale on the one hand, and on that of informational strength on the other (Grice, 1957; Horn, 1972). By virtue of the fact that (2) contains the stronger element "and" (given the scale <or, and>, where "and" entails "or"), and that (2) is not what was actually said, then one is entitled to assume that (2) does not hold, hence (3), in which the negation of the strongest alternative is added.

The main question that has been investigated experimentally so far is whether implicatures in *unembedded* or *root* contexts are costly or not. In this perspective, most of the experimental work aimed at measuring the processing cost of intepreting (1) as (3) in order to find evidence in support of one of two opposite theoretical approaches to SIs: Default approaches on the one hand (a.o. Chierchia, 2004; Levinson, 2000), that treat implicature computation as something that our computational/processing system performs automatically to maximise information content thus, by definition, is virtually costless (a claim which is in fact also shared by most Neo-Gricean approaches to SI); and Context-Driven theories on the other, like Relevance Theory (Sperber & Wilson, 1986), according to which every operation imposed to our processing system must be evaluated in terms of "costs and benefits", ultimately in terms of "relevance" to contextual assumptions so that only those stimuli that are relevant enough are worth a processing effort. As we shall see, our main point is orthogonal to the issue of a general *cost* of SI derivation and bears on it only indirectly.

In a broader theoretical perspective, the question of SIs is central to the ongoing debates concerning the definition of the status and interfaces of syntax, semantics and pragmatics. In this respect, different accounts have been developed to explain how and when implicatures are derived. Entering the details of this debate, however, goes well beyond the purposes of this work, whose main aim is that of presenting the results of a novel experimental work on SIs. The theoretical background of this work is constituted

by a recent paper by Chierchia (Chierchia, 2006), in which he proposes a unified account of Negative Polarity (NPIs), Free Choice (FCIs) and Scalar Items, building on the notion of "domain widening", polarity sensitivity and a general principle of pragmatic strengthening (cf. also Krifka, 1996). Specifically, for what concerns the phenomenon under discussion here, his main claim is that certain "pragmatic" processes, such as the process of deriving SIs, are part of the recursive/computational system: a binary feature σ is introduced as regulating the activation of scalar alternatives associated to scalar and polarity sensitive items (PSIs). This feature can be assigned two values: [±σ]. Selecting [+σ] results in the activation of the scalar/domain alternatives; selecting [-σ] results in the selection of the plain meaning in which the alternatives are not considered. While NPIs and FCIs obligatorily activate domain alternatives (i.e., always select [+σ] to be grammatical), Scalar Items only *optionally* activate their scalar alternatives. Once they are activated, they are factored into meaning via an alternative sensitive operator **O** similar to *Only* (cf. Fox, 2003). I won't pursue further the discussion on the parallelism of scalar and PSIs (this goes beyond the purposes of the present paper) but it's interesting to report a generalization on SIs already reported in Chierchia, 2002 (see also Kadmon & Landman, 1993): "(Ordinary) scalar implicatures are suspended in the contexts that license *any* (as a Neg Pol or as Free Choice Item)". Typically, these are the contexts defined as Downward Entailing (DE, or Downward Monotone), i.e. those contexts that licence inferences from sets to their subsets. For example, the antecedent of conditional represents a DE context, in contrast with the consequent of conditional, which represents an Upward Entailing context instead, allowing only inferences from a set to its superset. Crucially, adding an implicature in DE contexts leads to a weakening of the overall assertion (given that informativity is "reversed" in DE contexts), while it leads to a strengthening in case the scalar term appears in a NON-DE context. Considering our general tendency to be maximally informative and the monotonicity properties of the context, this is in fact how we normally interpret sentences like (4), representing a DE context, and (5), representing a NON-DE context.

(4) <u>If Lorenzo is singing or dancing</u> (*or both*) he's happy [DE]

(5) If Lorenzo is happy, <u>he is singing or dancing</u> (*not both*) [NON-DE]

Let's assume that scalar alternatives are activated in the examples above, i.e. that disjunction is interpreted as $or_{[+\sigma]}$. In terms of Chierchia's recursive approach, this would lead to the following interpretations, in which the SI is computed *locally* as soon as the scalar trigger is encountered:

(4') [if **O** (Lorenzo is singing or dancing), then he is happy] [DE]
=if Lorenzo is singing or dancing <u>but not both</u>, then he is happy

(5') [if Lorenzo is happy, then **O** (he is singing or dancing)] [NON-DE]
=If Lorenzo is happy, then he is singing *or* dancing <u>but not both</u>

Consider (4'): adding the SI locally, thus selecting the *exclusive* meaning of "or", would allow the inference in (4''), that really seems odd and unwarranted:

(4'') If Lorenzo is singing and dancing, then he is *not* happy

Taking into account the monotonicity of the context and our tendency to be maximally informative, the following distributional generalizations can thus be predicted:

i The exhaustive interpretation (via application of the operator **O)** of a scalar term is easier in NON-DE than in DE contexts, because it strengthens the assertion;
→ (5') is easier than (4')
ii. Having an implicature embedded in DE contexts is way harder than having it embedded in NON-DE contexts, because it weakens the assertion
→ (4') is harder than (5')
iii. The flip between having an implicature and not having it is relatively easy in NON-DE contexts
→ the activation of scalar alternatives is *optional* in case of scalar items
iv The flip between having an implicature and not having it is hard in DE contexts

2 The cost of embedding

In this section I will present an experimental study that tested the distributional generalization listed above with respect to the interpretation of *or* embedded in contexts that differ in monotonicity.

2.1 Participants

Thirty subjects participated in this experiment. They were mainly students at the Psychological Faculty of the University of Milano-Bicocca, and received credits for their participation.

2.2 Material and procedure

Participants were tested individually in a quiet room using a laptop. Their task was to evaluate sentences in certain situations, judging them "true" or "false" with respect to a scenario consisting of a block of four pictures to be considered as a whole. They were also told to be "charitable": whenever they encountered a sentence that could bear more than one interpretation, they should choose the one that rendered the sentence true, even if that interpretation was not their favoured one. To familiarize them with the procedure, they were shown a training session in which they were assisted by the experimenter. During this training, they encountered sentences that were clearly true in the scenario,

some that were clearly false and some that were somehow ambiguous. For example, they were presented with the sentence "Two girls are sitting on a chair" in a scenario depicting four different girls, each of them sitting on a chair. Typically, many subjects would tend to judge the sentence false in such a scenario, interpreting "two" as "exactly two" instead of being "charitable" and accessing the logical "at least two" interpretation. Whenever this happened, the experimenter prompted the participant to be charitable and ask her to revise her interpretation of the sentence accordingly as to make it true, if she found a way to do it. To keep track of this operation, participants were also asked the following question whenever they answered "true": "How much do you think the sentence is a good description of the situation represented in the pictures?" They were given a scale of response varying from 1 (bad) to 5 (good). In cases like the example above, we expected subjects that were prompted to be charitable to select a low score on the scale despite the fact that they accepted the sentence in the end.

The experiment proceeded as follows: each single sentence appeared in white at the top of a black screen. By pressing the space bar, a scenario consisting of four pictures appeared below the sentence. It's important to remember that the four pictures appeared altogether on the screen and were to be considered as a whole, unique scenario, representing the whole world to be taken into account in order to judge the sentence. Participants had to evaluate the sentence in such a scenario, pressing a green key if they judged it "true" and a red key if they judged it "false". Time taken to make a decision was recorded, starting from the moment they pressed the key to make the pictures appearing on the screen, till they pressed the answer key. Each subject was shown the complete battery of the material but saw only one occurrence per each critical item type, for a total of 17 test items, 4 of which were critical test sentences containing "or", and the others were controls and fillers. To avoid interferences from extra-linguistic factors, we only used fantasy names in the sentences during the experimental session. After the training session, subjects were told that they would explore different situations in planets different from Earth, meeting alien characters that used objects that are unfamiliar to inhabitants of Earth. They were also reassured that they were not required to memorize the names of these characters and objects, given that they would be provided with a description of each unfamiliar object immediately before each trial. Below, I provide an example of an introductory screen used before one test trial:

Fig. 1: Introductory screen: an example

The main purpose of having unfamiliar objects was that of ruling out world knowledge as much as possible: it's a well known fact that our expectations about how things go in usual circumstances may affect the computation or suspension of SIs. Think, for instance, at standard examples like "If you take the soup of the day or curry rice you'll pay the special price of 10$": solely guided by our world knowledge (and independently of the monotonicity of the context!), we would never expect to pay 10$ for taking both. However, given that our world knowledge do not extend to planet Glimp, we should bear no expectations whatsoever about situations that involve curps or dorfs or combinations of the two.

The experiment presented a 2×2 critical condition within subject design. First of all, two different types of sentences containing "or" were presented, differing in monotonicity (DE vs. NON-DE), as exemplified by the following examples (remember that only fantasy names were used in the experimental session):

(6) Condition I: context monotonicity
a. If a Glimp has a curp *or* a dorf, he also has a pencil [DE]
b. If a Glimp has a pencil, he also has a curp *or* a dorf [NON-DE]

Each sentence was presented in two different types of situation:

(7) Condition II: situations
S1 a situation in which the sentence is true on both readings
(I will refer to this as the "non-differentiating true" situation = NDT)
S2 a situation in which the sentence is true on one interpretation -crucially, the less informative one- but false on the other
(I will refer to this as the "differentiating-critical" situation = DC)

To well understand the experimental design, it's important to keep in mind that the two alternative interpretations of "or" are not logically *in*dependent of one another, given that one always entails the other and that the direction of entailment crucially depends on the monotonicity of the context: in NON-DE contexts, or_{exc} entails or_{inc}, thus the *exclusive* interpretation of "or" is the most informative in case of (b)-sentences; on the contrary, the *inclusive* interpretation of "or" is the most informative in case of (a)-

sentences, given that in DE contexts or_{inc} entails or_{exc}. Considering these entailment patterns, the critical conditions for each sentence types were, for instance, the ones reported below (presented to different subjects):

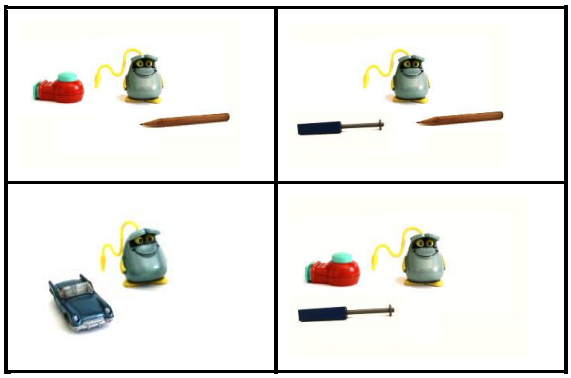


Fig. 2: (S1)
DC for DE context: *exclusive* "or" true
(curp & dorf but no pencil)

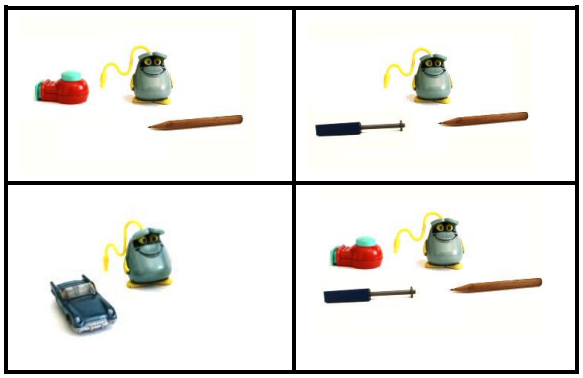


Fig. 3: (S2)
DC for NON-DE context: *inclusive* "or" true (curp & dorf but no pencil)

Note that the only crucial difference between the two scenarios is represented by the last picture in the sequence (during the experiment, the order of the pictures was randomized). Please note that these same configurations were also used as NDT conditions: for example, configuration S1 constituted the NDT condition for sentences of type (b) (i.e. NON-DE contexts) while S2 constituted the NDT condition for sentences of type (a) (i.e. DE contexts). Also, a control condition was added, that made the sentence false on any interpretation of "or" (non-differentiating false condition = NDF). For example, Fig. 4 was used as a control for (a) sentences:

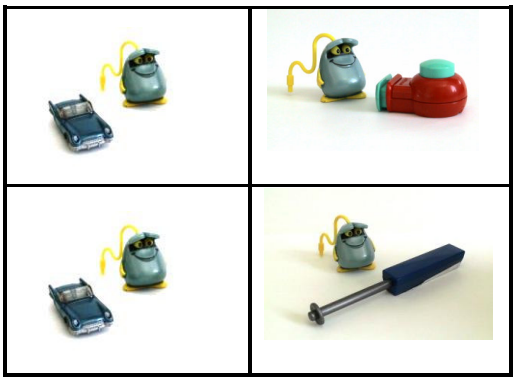


Fig. 4: (S3): control condition (NDF)

2.3 Results and Discussion

Results are summarized in Table 1 below[1]: column 4 reports the percentage of "true" answers; column 5 the rate assigned on the scale; columns 6-8 report respectively: the response times (RTs, in ms.) to answer "true" and "false" and the mean total time per condition (in parentheses the number of cases included in the analysis is shown).[2]

1	2	3	4	5	6	7	8
Sentence	**Context**	**Situation**	**True**	**Scale rate**	**RTs for True**	**RTs for False**	**Mean RTs (n.)**
(a)	**DE**	S1 (DC)	**57%**	3.47	11320	7167	9628 (n.27)
		S2 (NDT)	**90%**	3.81	8937	12362	9291 (n.30)
(b)	**NON-DE**	S2 (DC)	**77%**	4.04	10183	11754	10562 (n.29)
		S1 (NDT)	**87%**	4.38	9734	8341	9549 (n.29)

Table 1

By simply looking at the chart, one can immediately detect an interesting discrepancy between subjects' behavior on condition (a)-S1 (corresponding to the first row on the chart) and all the other conditions, a discrepancy that extends to all the measurements taken: it is the only condition in which subjects split; it gets the lowest rate on the scale; it takes the highest time to be accepted but the lowest time to be rejected.

Statistical analysis, in which different parameters were considered, gave support to this observation. First of all, I submitted our data to a 2 (context monotonicity: DE vs. NON-DE) x 2 (situations: S1 vs. S2) analysis of variance ANOVA using the proportion of "Yes" responses as the dependent measure. No significant effect of context monotonicity ($F(1, 116)=1.2787$, $p=.26048$) or situation ($F(1, 116)=2.5062$, $p=.11612$) was found, but a significant interaction of the two ($F(1, 116)=8.6437$, $p<.05$). Post-hoc analysis, by means of Fisher's LSD test, suggests that this effect is mainly due to a difference of the rate of acceptance of sentences of type (a) in condition S1 with respect to all the other conditions, as summarized as follows. Firstly, the proportion of subjects that accept (a)-sentences in condition S1 (corresponding to the DC, only *exclusive* condition for DE contexts) is significantly lower than the proportion of those that accept the same sentence in condition S2 (corresponding to the NDT condition) (57% vs. 90%, $p<.01$). Secondly, the proportion of acceptance of (a)-sentences in the critical condition

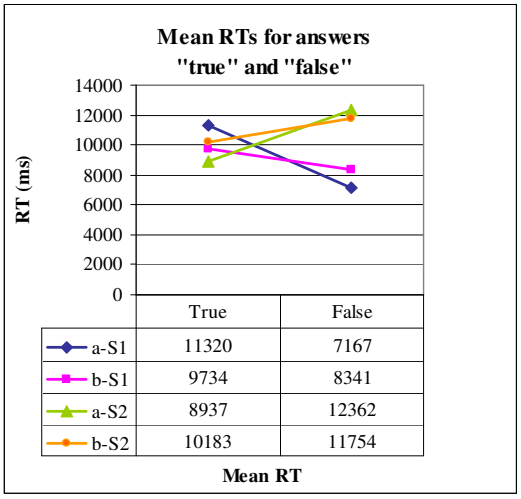
[1]In the chart, I don't report results on controls: consider that correct responses on these items are attested around 95% overall.

[2]Anomalous effects on RTs were curtailed in two steps: first, we excluded RTs exceeding 2.5 times the mean item time; then, values above individual cut-off (mean + 2 SD) were smoothed (over the total, 3,33% items were excluded and 3,75% smoothed).

S1 is also significantly different from the proportion of acceptance of (b)-sentences in the same condition (corresponding to the NDT condition for NON-DE contexts) (57% vs. 87%, p<.01). Thirdly, it is also marginally different from the proportion of acceptance of (b)-sentences in condition S2 (corresponding to the DC, only *inclusive* condition for NON-DE contexts) (57% vs. 77%, p=.057).[3] For what concern this last comparison, I would reasonably expect this discrepancy to be increased by removing the instruction "be charitable", that would have the effect of flattening the acceptance rate of sentences (a) in condition S1 (*exclusive* condition for DE contexts). Taken as a whole, these findings seem to suggest that adding an implicature in a DE context (i.e., accepting sentence (a) in the critical condition S1) is not a natural option that we would select automatically in our ordinary conversation, unless we are prompted to do so (as in this case, where participants were asked to be charitable). This same conclusion seem to arise from the comparisons across the rates assigned on the scale in case of "Yes" responses. Taking this rate as the dependent measure, I conducted an analogous 2x2 analysis of variance ANOVA, finding a significant effect of context (F(1,89)=5.866, p<.01). Fisher's LSD post-hoc test revealed that this effect is only due to the difference between the rate assigned on the scale when accepting sentence (a) in S1 (namely, 3.47) and the higher rate assigned when accepting sentence (b) in the same condition (namely, 4.38) (p<.01), a result that still seems to indicate that participants are less prone to accept *exclusive* "or" interpretation in DE than in NON-DE contexts.

Time taken to evaluate sentences was also analysed. A first point worthy of remark is the fact that no significant difference emerged in a 2x2 analysis of variance ANOVA taking context (DE vs. NON-DE, (F(1, 111)=.33, p=.57) or situation (S1 vs. S2, F(1, 111)=.11, p=.74) as critical factors, nor an interaction between the two (F(1, 111)=.42, p=.52). These results seem to indicate that the processing load required to evaluate sentences in both conditions was almost identical, at least considering mean RT. However, one needs to integrate this finding by considering the type of answer given ("True" vs. "False") separately, as plotted in the graph below:

[3] Conforming to the most standard procedure in the literature, I decided to perform an ANOVA to analyse my data (despite the presence of dichotomic variables). Note, however, that these same effects were replicated by means of an analysis of proportion: a-S1 vs. a-S2: $\chi^2(1, 60)=8{,}52$, p<.01; a-S1 vs. b-S1: $\chi^2(1, 60)=6.65$, p<.01.



Graph 1

Disregarding Condition I, thus independently of context monotonicity, a significant interaction between situation and type of answer was revealed by an ANOVA on RTs ($F(1, 111)=4,44$, $p<.05$). Post hoc analysis, by means of Fisher's LSD, revealed that this difference is due to the fact that the time taken to answer "False" in S2 is significantly higher than the time taken to answer "False" in S1 ($p<.05$). Interestingly, no other difference emerged. In particular, no significant difference was revealed between S1 and S2 considering the time taken to accept the sentences, independently of context monotonicity. Such a comparison, in fact, would be a crucial one to detect a presumptive "cost" of SI computation: in order to accept the sentences in scenario S1, that is compatible with *exclusive* "or", one should add the implicature, thus adding a "cost" to the base sentence processing time. Other pairwise comparisons between RTs were made, always taking the type of answer ("True" vs. "False") as the critical factor. Interestingly, only one comparison revealed statistically significant. Precisely, this was the time to accept (a)-sentences in S1 (DC – only *exclusive*- condition for DE contexts), compared to the mean time to reject it in the same condition ($t(25)=2.21$, $p<.05$). No other significant contrast emerged in analogous pairwise comparisons, and this fact is particularly intriguing if we take into account the predictions that non-Default theories would put forward in this case. In particular, Context-Driven theories would predict a difference between the time taken to accept (a) sentences in S1 (DC-only *exclusive*-condition for DE contexts) and the time taken to accept (b) sentences in S2 (DC-only *inclusive*- condition for NON-DE contexts), given that solely in the first situation an implicature must be added to accept the sentence. Also, they would predict higher RTs in rejecting than accepting (b) sentences in S2 (DC-only *inclusive*- condition for NON-DE contexts), given that such a rejection would be the effect of the addition of the SI associated to "or". According to their theoretical claims, the "cost" of deriving the implicature should result in increased processing time. Crucially, both the comparisons mentioned are far from being significant ($p=.52$ and $p=.61$ respectively). On the contrary, RT measures clearly seem to indicate that only subjects that accessed the

exclusive "or" interpretation in DE contexts did it at a "cost" (i.e., they took significantly longer to accept than to reject sentence (a) in S1, thus keeping with the more informative- *inclusive*- interpretation of "or"). Crucially, however, this "cost" seems should not be evaluated as a general addition to the processing load due to SI derivation *per se*, given that, as we mentioned, this "cost" does neither exceed the processing load required to accept (b) sentences in S2 (DC-only *inclusive*- condition for NON-DE contexts), nor is recorded when rejecting (b) sentences in such a situation.

All in all, our findings seem to conform to the distributional generalizations listed in section 1, and summarized below for convenience. In the first place, the predictions made in (i) and (ii) (i.e., (i): the exhaustive interpretation (via application of the operator **O**) of a scalar term seems easier in a NON-DE than in a DE context; (ii) having an implicature embedded in a DE context is way harder than having it embedded in a NON-DE context) are attested by the differences observed between sentences (a) (=DE context) and (b) (= NON-DE context) in situation S1 (DC –only *exclusive*- condition for DE contexts) in the rate of acceptance (57% vs. 87%, $p<.01$) and scale rate (3.47 vs. 4.38, $p<.01$). Secondly, the prediction in (iii) (i.e.: the flip between having an implicature and not having it is relatively easy in NON-DE contexts) is attested by the fact that participants treated sentences (b) alike in the two situations (in this case, the differences recorded in the rate of acceptance and in the RTs are only numerical, not statistically significant). Also, the fact that 77% of participants accepted (b)-sentences in situation S2 (DC –only *inclusive*- condition for NON-DE contexts) may reflect a "charitable" strategy, ultimately it may be evaluated as the effect of the instruction given. In terms of Chierchia's analysis, it may reflect the choice of selecting $or_{\text{-}\sigma}$, leaving the scalar alternatives inactive, to conform to the strategy suggested by the experimental setting. Lastly and most importantly, prediction (iv) (i.e.: the flip between having an implicature and not having it is hard in DE contexts) is attested by the major findings obtained in case of sentence (a) in S1 (DC –only *exclusive*- condition for DE contexts) and discussed above in details: namely, the fact that this condition got the lowest acceptance rate, the lowest rate on the scale and the highest RTs in case of acceptance.

3 Concluding remarks

One of the questions addressed in this experiment was the influence of context, ultimately the role of monotonicity and its effect on informativity, on SI computation. Taking into consideration subjects' distribution in accepting/rejecting the critical sentences in the relevant conditions, it seems that our results provide a clear answer to this question. In the first place, subjects clearly treat the two sentences differently. In particular, they derive SIs more when "or" appears in NON-DE than in DE contexts: in a situation compatible with the *exclusive* reading of "or", like S1, they accept sentences (b) significantly more than (a). This distribution is a hint that subjects are sensitive to

abstract logical properties, such as monotonicity, when evaluating sentences containing scalar items. Secondly, they treat (a)-sentences (representing DE contexts) differently in the two situations: namely, they overwhelmingly accept them in a situation compatible with *inclusive* "or" (S2), but they split in a situation in which only *exclusive* "or" interpretation makes the sentence true (S1). Again, this result is an indication that subjects are aware of informativity, which crucially links to monotonicity: computing SIs in DE contexts weakens the overall assertion, and this may be the reason why accepting (a) sentences in S1 is a less likely and a more unfelicitous option (as revealed by the lowest acceptance rate and scale rate) and it is more costly in terms of processing load (as revealed by the highest times taken to accept it). This last result is particularly intriguing. According to the framework I am adopting, no general cost is to be associated to scalar implicature computation *per se*, contrary, for example, to Relevance Theory's predictions. A "cost" is instead to be expected if implicatures are added ("locally") in DE contexts, given that this would result in a loss of informativity. I believe that this finding need to be considered in the debate on the "cost" of SIs: if a "cost" were to be attributed to implicature computation *per se*, as Relevance Theory suggests, then, not only we should find for (b)-sentences in S2 (DC –only *inclusive*-condition for DE contexts) an analogous contrast in RTs to the one found for (a)-sentences in S1 (DC –only *exclusive*- condition for DE contexts), but we should also get significantly higher RTs in accepting (a) sentences in S1 than accepting (b) in S2. As we saw, none of these comparisons were significant. In this respect, these results seem to be in contrast with recent works on SI computation realized within Relevance Theoretic tradition (e.g. Noveck and Posada (2003), Bott and Noveck (2004), Breheny et al. (2005) and Katsos et al. (2005)). By means of different techniques, these authors conducted on-line experiments with adults evaluating sentences containing scalar terms in different settings. Very generally, their results seem to point to the same direction, namely: whenever subjects compute SIs, they do it at a "cost", that is reflected by a slowdown in correspondence of the scalar trigger when measuring reading times or by an increased time to process the whole sentence. These results were uniformly interpreted as evidence of the "cost" of SIs. Without entering the details of each study, I would like to make some general considerations about their findings. In the first place, the slowdown could simply reflect a general attitude of "pragmatic" responders, as also suggested by Noveck and Posada (2003). Secondly, the possibility that a strategy is involved is also attested by subject's distribution: in most (if not all) cases subjects split when they have to judge an underinformative sentence, especially when sentences are given "out of the blue", in the absence of a preceding context (a result also replicated here for condition (b)-S2), as if some participants consider the implicature "relevant enough" (to borrow from Relevance Theory terminology) and thus add it, while others don't. I believe that the solution proposed by Chierchia well explains these facts, being the activation of the alternatives optional, and also being the flip between having or not having the implicature in NON-DE contexts way easier than in DE contexts. On the contrary, it's more difficult to find a ready explanation of this split in subjects' distribution within Relevance Theory, given that the presumption of optimal relevance of a given stimuli should in principle be the same across participants in the same task.

To conclude, our findings seem compatible with Chierchia's "logicality" approach, which assumes that SI are computed "locally", as part of the recursive computational process and not via post grammatical operations, and that their derivation is regulated by a feature that (optionally) activates scalar alternatives but (mandatory) selects the most informative interpretation (which depends on monotonicity). Moreover, with respect to the theoretical issues explored above, we believe that our results may cast some doubts on the hypotheses that SI derivation is costly *per se*. Most importantly, they confirm the value of integrating theoretical claims in semantics with experimental work.

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Specificity as Referential Anchoring: Evidence from Russian*

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Abstract

In some languages different specific and non-specific readings of indefinites may be disambiguated by indefinite pronouns used as determiners. Our investigation of specificity markers in Russian shows that they mark different referential anchoring of new discourse referents which are introduced by indefinite noun phrases to already established discourse referents. The idea of referential anchoring can be modeled via parameterized choice functions. The proposed analysis suggests that semantics and pragmatics divide the labor of fixing the anchor for indefinites. The restrictions on the type of referential anchor may be encoded in the lexical entry of the specificity marker, or arise pragmatically from contrasts to other possible markers.

1 Introduction

It is well known in the literature that indefinites are generally ambiguous between so-called specific and non-specific readings. It has been shown (cf. Farkas 1995, von Heusinger 2007) that specificity cannot be described with a ±feature but has a fine-grained structure. Under the label of "specificity" different distinctions have been discussed, including epistemic and scopal specificity. The epistemic specificity can be traced back to Fodor and Sag (1982). They observe that the indefinite *a student* may have both a specific and a non-specific interpretation.

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(1) a. A student in Semantics cheated on the exam. His name is David.
b. A student in Semantics cheated on the exam. I am trying to figure out who it was.

Fodor & Sag characterize the ambiguity of *a student* in the following way: under the specific reading the speaker has an intended referent in mind, i.e., knows who the cheater is, as the continuation in (1a) indicates. In contrast, in the non-specific reading as in (1b), the speaker has no particular referent in mind. Since the type of specificity in (1) concerns the way in which the use of an indefinite is related to the information state of the speaker who uses it, it is called "epistemic specificity" by Farkas (1995).

The type called "scopal specificity" is a more traditional one. Scopal specificity has been observed in contexts with strong intensional operators[1] such as with the modal *want*. If the value of the indefinite is fixed independently of the domain of such an operator as in (2a), the indefinite is interpreted as specific, that is taking wide scope. If the value of the indefinite is dependent on the domain of such an operator as in (2b), the referent receives a non-specific interpretation, that is it takes narrow scope.

(2) a. John wants to marry *a student.* She is rich.
b. John wants to marry *a student.* He couldn't find one.

However, in examples like (2a), in which the indefinite is scopally specific, two readings with respect to epistemic specificity are possible:

(2') John wants to marry *a student*. She is rich. (scopally specific)
Reading 1: The speaker has a particular student in mind.
(epistemically specific)
Reading 2: The speaker has no particular student in mind, but John knows the student. (epistemically specific)

All in all, the indefinite *a student* is ambiguous in three ways. Its interpretation depends on at least **two parameters**: the identifiability of the referent by the speaker and its scope relative to other operators in the clause. The NP may be scopally non-specific if the referent of the NP does not exist in the actual world; in this case it is also epistemically non-specific. The NP may be epistemically non-specific if the referent does exist but the speaker cannot identify it, and it is epistemically specific if the referent exists and the speaker can identify it.

[1]According to Farkas (2002), the so-called weak intensional predicates like *believe* or *dream* do not have the same consequences for specificity as strong intensional predicates like *want* and *must*, therefore I ignore the weak intensional predicates in this paper.

While in many languages there are unmarked indefinites which tend to reflect the total amount of specificity-related ambiguities, languages may also overtly mark different types of specificity by different means such as indefinite pronouns (English, German, Russian, etc.). The differences between these specificity markers has been controversially discussed (cf. Farkas 2002 for English; Kagan 2007, Yanovich 2005 for Russian). In this paper, we claim that the difficulty in assigning precise semantic values for some markers of specificity can be traced back to semantic underspecification and pragmatic enrichment. In particular we will present a semantic model for indefinites based on the notion of referential anchoring and will show how this notion accounts for scope and epistemic effects with the three pronominal series in Russian.

The paper is organized as follows: Section 2 presents Russian data and shows that the idea of specificity as relative referential anchoring can account for differences between specificity markers. Section 3 introduces the formal reconstruction of referential anchoring via Choice Function and its application to Russian. Section 4 shows how the underspecified semantics of the specificity marker *to* can be pragmatically enriched in context. Section 5 concludes the main results of the paper.

2 Specificity Marking in Russian

Russian is an article-less language. Noun phrases may be interpreted as definite or indefinite depending on the information structure and word order. In addition, noun phrases can be accompanied by different indefinite pronouns used as determiners specifying different interpretations of noun phrases (cf. Dahl 1970, Ioup 1977). There are many pronominal series consisting of a *wh*-pronoun combined with some affix (cf. Haspelmath 1997). In this paper, we will investigate the following three series of indefinite pronouns formed by the suffixes *to*, *nibud',* and by the prefix *koe*: *wh-to, wh-nibud', koe-wh,* cf. (3).

(3) Igor' hochet zhenit'sja na *koe-kakoj / kakoj-to / kakoj-nibud'* studentke.
Igor wants marry at koe-wh / wh-to / wh-nibud' student
'Igor wants to marry a student.'

These pronominal determiners disambiguate different readings with respect to the identifiability of the referent by the speaker and scope.

2.1 Identifiability by the Speaker

In Russian, epistemically specific and epistemically non-specific NPs can be overtly distinguished by indefinite pronouns; cf. the example from Fodor & Sag (1982) in (4) translated into Russian.

(4) a. *Koe-kakoj* student spisyval na ekzamene. Ego zovut Ivan Petrov.
koe-wh student cheated on exam he is-called Ivan Petrov
'A student [known to the speaker] cheated on the exam. His name is Ivan Petrov.'

b. *Kakoj-to* student spisyval na ekzamene. Ja pytajus' vyjasnit', kto eto byl.
wh-to student cheated on exam I try to find-out who it was
'A student [not known to the speaker] cheated on the exam. I am trying to figure out who it was.'

According to Haspelmath (1997), the *koe*-series indicates that the speaker has a particular referent in mind, i.e., the referent of the NP is somehow anchored to the speaker. By using *to*-series, in contrast, the speaker conveys that he cannot identify the referent (cf. also Haspelmath 1997:45). Thus *koe* indicates epistemic specificity while *to*- encodes epistemic non-specificity.

However, although *-to* indefinites cannot be anchored to the speaker, they can be anchored to other discourse entities, like the discourse referent introduced by the subject-NP in the matrix clause; cf. (5) from Dahl (1970).

(5) Ona skazala, chto on govorit s *kem-to* po-telefonu. (Dahl 1970:35)
she said that he was-talking to wh-to on telephone
'She said that he was talking to somebody on the telephone.'

Dahl points out that this sentence is ambiguous in the same way as its English translation: she may have said *He is talking to John*, which indicates that she knows to whom he is speaking, thus she can identify the referent. In another reading, she may have said *He is talking to somebody*, that is, she cannot identify the person he is talking to. In this case, the referent of the NP is identifiable only to him. Further, Dahl points out that in some examples the referent of a *to*-NP need not be identifiable to any discourse referent in the clause.

(6) Ona govorit, chto *kto-to* ukral ee koshelek. (Dahl 1999:673)
she said that wh-to stole her purse
'She said that someone stole her purse.'

In this example, the referent introduced by the NP *kto-to* is not identifiable either to the speaker or to the subject-referent.

To sum up, for the interpretations of the *to*-series, there is no requirement that any particular person possesses identifying knowledge, but only that the referent is not identifiable by the speaker. Different human discourse referents in the sentence can, but need not, possess this identifying knowledge. In contrast, *koe* strongly indicates the identifiability of the referent by the speaker.

But what about the *nibud'* series? This pronominal series can only occur in the scope of some operators. e.g. intensional predicates as in (7). Since it is impossible to use *nibud'* in a simple declarative sentence, it can be called a *polarity determiner*. The continuation indicating the non-identifiability of the referent by the speaker, which is compatible with the *to* series, is also compatible with *nibud'*. But with the *to* marker, it is possible to interpret (7) in the way that the student is identifiable to Igor, i.e., the student may be identifiable to the discourse individual who is different from the speaker. In contrast, the *nibud'* marker indicates the non-identifiability of the individual to the speaker, or to any other individual for that matter.

(7) a. Igor' hochet zhenit'sja na ***koe-kakoj / -to / -nibud'** studentke.
Igor wants marry koe-wh /wh-to / wh-nibud' student
'Igor wants to marry a student.'
b. Continuation: Ja ne znaju, na kakoj.
'I don't know who.'

The difference between indefinites marked with *nibud'* and with *to* seems to be the difference in scope.

2.2 Scope

The three specificity markers have a different impact on the scope of the NP. *Koe*-indefinites take wide scope with respect to intensional and extensional operators. *Nibud'* always indicates narrow scope and has to be licensed by operators or quantifiers in the clause. The scope of NPs marked with the *to* series seems to vary depending on the type of operator, intensional versus extensional. We will discuss both contexts separately.

Contexts with intensional operators

To-indefinites take wide scope with respect to intensional operators, such as future and intensional predicates like *iskat' 'to look for'* and *chotet' 'to want'* (cf. Pereltsvaig 2000).

(8) Igor' hochet zhenit'sja na *koe-kakoj / -to / *-nibud'* studentke.
Igor wants marry koe-wh / wh-to / wh-nibud' student
'Igor wants to marry a [specific] student.'
Continuation: On znakom s nej dva goda. → wide scope
'He has known her for two years.'

(9) Igor' hochet zhenit'sja na **koe-kakoj / *-to / -nibud'* studentke.
Igor wants marry koe- wh / wh-to / wh-nibud' student
'Igor wants to marry a [non-specific] student.'
Continuation: On poka ni s kem ne poznakomilsja. → narrow scope
'He didn't get to know anybody.'

Contexts with extensional operators

In contexts with extensional quantifiers, like with universal quantifiers, *koe* and *nibud'* determiners behave in the same way as with intensional operators: *koe* indicates wide scope, while *nibud'* indicates narrow scope. However, the behavior of *to*-indefinites seems to be more complicated.

To-indefinites may take wide scope relative to extensional quantifiers.

(10) Kazhdyj student voschischchaetsja *koe-kakim / -to / *-nibud'* professorom.
Every student admires koe-wh /wh-to/ wh-nibud' professor
'Every student admires a certain professor.'
Intended Reading: 'the same professor' → wide scope

But narrow scope for *to* is also possible (cf. Kagan 2007).

(11) Kazhdyj student voschishchaetsja **koe-kakim / -to / -nibud'* professorom.
Every student admires koe-wh / wh-to / wh-nibud' professor
'Every student admires a professor.'
Intended Reading: 'more than one professor' → narrow scope

Since *to* indefinites can take narrow scope relative to universal quantifiers, the problem of distinguishability with *to* and *nibud'* arises. The difference seems to lie in the dependency between the indefinite marked with *to* or *nibud',* and the quantifier expression. If the *to*- indefinite takes narrow scope, it differs from *nibud'* in the property of co-variation, cf. (12).

(12) Kazhdyj rebenok poluchil na Rozhdestvo **kakoj-nibud' / -to* podarok.
every child got for Christmas koe-wh / wh-to gift
'Every child got for Christmas a certain gift.'

Continuation: A imenno tot, kotoryj on ozhidal.
Namely the one which he expected.

The natural interpretation of (12) with its continuation is that gifts are distributed to all the children in the context. The continuation with a bound variable pronoun forces strict dependency between the quantifier expression and the indefinite: different instances of the gifts must co-vary with different children. The continuation requires the non-random choice of value for the variable introduced by the indefinite NP.

The strict distributive reading is only possible with *to*. For *nibud'*, narrow scope readings in which the referent of the indefinite strictly depends on some referents in the clause are not available. *Nibud'* indicates that the referent of the indefinite is in principle not identifiable and signals the randomness of referent choice.

The differences between the three pronominal series discussed in this section are summarized in Table 1.

Table 1: *Distinctions between pronominal series in Russian*

Distinguishing criteria	***koe-wh***	***wh-to***	***wh-nibud'***
Identifiability of the referent by the speaker	yes	no	no
interaction with intensional operators	wide scope	wide scope	narrow scope
interaction with extensional quantifiers	wide scope	wide / narrow scope	narrow scope
co-variation under narrow scope		yes	no

3 Semantic Analysis

It is obvious that the distinctions between the specificity readings discussed in the previous section cannot be described via feature ± specific. Specificity rather seems to

have a fine-grained structure. The referent introduced by the indefinite NP can depend on other expressions in the clause as universal quantifiers or discourse participants like the speaker. In order to account for such dependencies we will introduce the notion of referential anchoring (von Heusinger 2007) which we will model as parameterized choice functions (Kratzer 1998) involving an implicit *e*-type argument.

3.1 Referential Anchoring

In the discussion about indefinites, examples in which narrow scope indefinites strictly co-vary with the quantifier phrase have been widely discussed, as in (13a) where the dates are strictly dependent on the individual husbands. Based on Kratzer (1998), we assume that this dependency can best be accounted for as shown in (13b):

(13) a. Each husband has forgotten a certain date – his wife's birthday (Hintikka 1986)
b. $\forall$x(husband(x) → had forgotten (x, f_x(date))) (Kratzer 1998)

In the formalism, *f* is a free function variable, representing a contextually salient partial function from individuals into choice functions. The subscripted x is an implicit argument of the indefinite and is of type *e*. f_x is a partial choice function that takes some set as an argument and returns an individual member of this set. In our example (13), the implicit argument is bound by the universal quantifier and therefore f_x maps the set of dates to particular dates depending on each husband. In other words, the dates are referentially anchored to each husband. Note that if the implicit argument was not anchored to husbands but, say, to the speaker, as in (14), the indefinite would get wide scope reading.

(14) a. Each husband has forgotten a certain date – the 8th of March
b. $\forall$x(husband(x) → had forgotten (x, $f_{SPEAKER}$(date)))

Assuming that argumental indefinites can generally be modelled as parameterized choice functions in this way, argumental indefinites always introduce discourse referents referentially anchored to some other individual. The major advantage of this view is that the referential anchor, modeled as an implicit argument, allows for interaction both with quantifier expressions and discourse participants. Different readings of indefinites can now be captured as the difference in the choice of anchor.

3.2 Binding Constraints on Implicit Argument

For the semantic analysis of specificity markers, we assume that argumental (*e*-type) indefinites are underspecified with respect to the effects of specificity, but lexical markers may fix different specific readings by imposing constraints on the binding of

the implicit argument. The contrasts summarized in Table 1 can now be captured by constraints on the implicit argument. We assume that the specificity markers *koe, to, nibud'* take <*e,t*> type arguments and ignore the meaning of the *wh*-pronoun combined with specificity markers for the sake of simplicity.

Table 2: S*pecificity markers in Russian*

	koe-	***-to***	***-nibud'***
lexical entry	$\lambda P\ f_x(P)$ x=speaker	$\lambda P\ f_x(P)$	$\lambda P\ \exists x\ f_x(P)$
identifiability of the referent by the speaker	yes	no	no
interaction with intensional operators	wide scope	wide scope	narrow scope
interaction with extensional quantifiers	wide scope	wide / narrow scope	narrow scope
co-variation under narrow scope		yes	no

As shown in Table 2, the only difference between the lexical entries of specificity markers concerns the binding of the implicit argument x. The implicit argument of *koe* must be bound by the speaker, yielding identifiability by the speaker and necessary wide scope.

According to Table 2, the implicit argument of the non-specificity marker *nibud'* is existentially closed at the lexical level yielding non-identifiability of the referent by the speaker, narrow scope, and the lack of co-variation reading. We interpret the fact that for *nibud'* no specific anchor exists in the following way: indefinites accompanied by *nibud'* introduce a completely random referent. The referent of a *nibud'*-indefinite is not identifiable. However, the lexical entry of *nibud'* is still a simplification since the fact that *nibud'* needs licensing by some operators in the clause is not yet integrated in it.

The lexical entry of *to* given in Table 2 is the most underspecified one. In contrast to *koe* and *nibud'*, the implicit argument of *to* is not bound at the lexical level and there are no lexical constraints on its binding. We consider the underspecified anchoring of

indefinites with *to* to be the key for the explanation of their different interpretations. For the implicit argument of *to*, different possibilities arise depending on the context: in contexts with intensional operators as in (15a), the implicit argument may be bound to some discourse referent different from the speaker as shown in (15b), or existentially closed in the preceding context as is shown in (15c). Both possibilities yield wide scope with respect to intensional operators.

(15) a. Igor' hochet zhenit'sja na *kakoj -to* studentke.
Igor wants marry wh-to student
'Igor wants to marry a student.'
b. ….*kakoj-to* studentke WANT … f_{IGOR}(student) → wide scope
c. ….*kakoj-to* studentke: ∃x. …WANT… f_x(student) → wide scope

In contexts with an extensional quantifier as in (16), the possibility of binding the implicit argument of *to* by an extensional quantifier arises. This binding yields co-variation reading under narrow scope.

(16) a. Kazhdyj muzh zabyl *kakoj-to* den', a imenno den' rozhdenija svoej zheny
Each man forgot wh-to date namely birthday of his wife
'Each husband has forgotten a certain date – his wife's birthday.'
→ narrow scope, co-variation
b. ∀x(husband(x) → had forgotten (x, f_x(date)))

In contexts without operators or quantifiers as in (17a), the implicit argument of *to* is existentially bound by default, cf. (17b). Note that *nibud'* is not licensed in (17).

(17) a. Ona govorit, chto *kto-to / * -nibud'* ukral ee koshelek (= 6)
she said that wh-to / *wh-nibud' stole her purse
'She said that someone stole her purse.'
b. … *kto-to*: ….∃x f_x(human)

We see that there are many possibilities to bind the implicit argument of *to*, but some possibilities are excluded. Firstly, the implicit argument of *to* cannot be bound to the speaker, that is *to* avoids the binding pattern of *koe*. Secondly, the implicit argument of *to* cannot be existentially bound in the scope of some operator, in other words, *to* avoids the binding pattern of *nibud'*. However, the existential binding for the implicit argument of *to*, which is conventionalized for *nibud'*, is possible for *to* in contexts in which *nibud'* is not licensed as in (17). Observing these regularities, we come to the conclusion that the binding of implicit arguments of *to* must be restricted by pragmatic principles.

4 Pragmatic Enrichment

The aim of this section is to show that the preferences for particular interpretations of indefinites with *to* arise from the contrast with other specificity markers which may be used in the same context.

_to_ vs. _koe_: contrast in identifiability

The contrast between *to* and *koe* is based on speaker identifiability. Both markers can occur in any logical environment and since *koe* lexically signals that the speaker is the referential anchor, we consider *koe* to be more informative. Therefore, if *to* is used, the hearer can infer that the conditions for *koe*, namely speaker anchoring, are not met. From here we derive the reading of *to* as marking the non-identifiability of the referent by the speaker. As was assumed in (Geist & Onea 2007b), it is a standard scalar implicature since *koe* logically implies *to*. This implicature can be cancelled or reinforced as in (18).

(18) a. Igor videl *kakuju-to* zhenschchinu.
Igor saw wh-to woman
'Igor saw some woman.'

b. Reinforcement
Ja dejstvitel'no ne znaju kto eto byl.
'I really don't know who it was.'

c. Cancellability
Mne kazhetsja, ja ee znaju.
'It seems to me that I know her.'

_to_ vs. _nibud'_: different contrasts

On the other hand, *to* contrasts with *nibud'* in contexts with intensional operators and extensional quantifiers. Again, *nibud'* has restrictions on the implicit argument, existentially binding it at the lexical level, which makes *nibud'* more "marked" than *to*. *To* has no such restrictions. Pragmatic reasoning now applies in different ways for intensional and extensional contexts.

***to* vs. *nibud'*: contrast in scope with intensional operators (wide vs. narrow)**

In intensional contexts as in (19), wide and narrow scope come into consideration. *Nibud'* signals narrow scope and therefore the implicature arises that *to* signals wide scope. In this case, the referential anchor can be identified with some discourse individual as the subject of the clause, Igor, cf. (19b), or be existentially bound out of the scope of the intensional operator.

(19) a. Igor' hochet zhenit'sja na *kakoj-to / -nibud'* studentke.
Igor wants marry koe-wh / wh-nibud' student
'Igor wants to marry a student.'
b. *kakaja-to* studentka: f_{IGOR}(student)

In extensional contexts, on the other hand, two different contrasts may arise for *to* vs. *nibud'*.

***to* vs. *nibud'*: contrast in scope with extensional operators (wide vs. narrow)**

Nibud' always indicates narrow scope and the lack of co-variation. If *to* is used, the hearer can infer that the conditions for *nibud'*, namely narrow scope and the lack of co-variation, are not met. Therefore, *to* may contrast with *nibud'* in two ways: with respect to scope, or with respect to co-variation under narrow scope. The example (20) represents the contrast in scope. Since here wide scope of the indefinite is intended and *nibud'* can always indicate narrow scope, *to* may be used to indicate wide scope.

(20) a. Kazhdyj student voschishchaetsja *kakim-to / * -nibud'* professorom,
Every student admires wh-to / wh-nibud' professor
'Every student admires *wh-to* professor,
Continuation: Igor' ego znaet. → wide scope
Igor knows him.'
b ∀x(student(x) → admire (x, f_{IGOR}(professor)))

***to* vs. *nibud'*: contrast in co-variation within narrow scope**

On the other hand, *to* may contrast with *nibud'* with respect to co-variation under narrow scope. The co-variation must be triggered by the appropriate continuation as in (21) or by the context.

(21) a. Kazhdyj student voschishchaetsja *kakim-to / * -nibud'* professorom,
Every student admires wh-to / wh-nibud' professor
'Every student admires a certain professor,
Continuation: k kotoromu on chodit na lekciju. co-variation: different

whose lectures he attends.' professors co-vary with different students

b $\forall x(\text{student}(x) \rightarrow \text{admire}(x, f_x(\text{professor})))$

The co-varying reading cannot arise with *nibud'* since its implicit argument is existentially bound and cannot be made dependent on a quantifier expression. Therefore, if *to* is used for narrow scope with extensional quantifiers, the hearer can infer that it signals co-variation which cannot be signaled by *nibud'*.

Thus, the variability in interpretation of indefinites with *to* can be accounted for by its underspecified semantics. The preferences for a particular reading arise from the contrast with other specificity markers which may be used in the same context.

5 Conclusion

I have argued here for uniform semantics with the three pronominal series used as indefinite determiners in Russian. Each indefinite determiner introduces an implicit argument and a function which chooses a particular individual from a set depending on some implicit argument. This implicit argument interacts with quantifiers and the discourse context, fixing an appropriate referential "anchor" for the indefinite. We further have suggested that the three pronominal series examined differ with respect to the constraints they impose on the binding of the implicit argument. The *koe* series is marked in that it lexically encodes a constraint requiring the implicit argument to be identical to the speaker. The *nibud'* series is marked in that it lexically encodes a constraint requiring the implicit argument to be unspecified. The *to* series is unmarked in that it imposes no lexical constraints on the binding of its implicit argument. In the case of *to,* however, pragmatic constraints arising from contrasts to other available markers apply. These constraints exclude for the *to* series the binding patterns typical for *koe* and *nibud'*. My analysis suggests that all argumental indefinites are anchored. The restrictions on the type of the referential anchor may be determined by the lexical semantics of the specificity marker, or may be derived by pragmatic reasoning.

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Restructuring and Implicative Properties of *volere*[*]

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Abstract

This paper deals with a puzzling interaction between Italian *volere* (*want*) and viewpoint aspect. With perfective aspect (but not with imperfective), *volere* acts like an implicative predicate (such as *manage*): the proposition expressed by its complement clause has to hold in the actual world, and not merely, as expected from a standard semantics for desire predicates (cf. Hintikka 1962, Heim 1992), in the subject's desire worlds. I show that this peculiar effect can be explained by invoking the restructuring properties of *volere*. In particular, I take Italian restructuring constructions to be monoclausal (Wurmbrand 2001) and involve a single Tense and Aspect projection, resulting in a single event quantification. This single event quantification yields a single event, which has to occur both in the actual world and in all of the subject's desire worlds. I further show that *volere*'s lack of implicative behavior with imperfective aspect arises from an additional layer of modality associated with the imperfective.

1 Introduction

This paper discusses the intriguing interaction of Italian *volere* (*want*) with viewpoint aspect. Perfective aspect on *volere* seems to force the proposition expressed by its complement clause to hold in the actual world, and not merely, as expected from standard semantics for desire predicates (cf. Hintikka 1962, Heim 1992, a.o.), in all of the subject's desire worlds. As shown in (1), denying that the complement clause took place in the actual world yields a contradiction, but not in (2):

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(1) Gianni ha voluto parlare a Maria, #ma non lo ha fatto.
Gianni want-pst-**pfv** talk to Maria But not it do-pst-pfv
'Gianni wanted to talk to Maria, #but he didn't do it.'

(2) Gianni voleva parlare a Maria, Ma non lo ha fatto.
Gianni want-pst-**impf** talk to Maria But not it do-pst-pfv
'Gianni wanted to talk to Maria, but he didn't do it.'

The first question that this data raises is why the perfective, a mere aspectual marker (i.e., a quantifier over events), forces the actualization of the complement, but not the imperfective. As we will see, the same puzzle arises with root modals (Bhatt 1999, Hacquard 2006). Perfective aspect on a root modal (such as ability *can*) yields what Bhatt calls an 'actuality entailment', that is, an undefeasible inference that the proposition expressed by the modal's complement took place in the actual world. Actuality entailments with root modals can be found in many languages that show a morphological distinction between perfective and imperfective aspect (such as Italian, French, Hindi…). The following Italian examples illustrate:

(3) Gianni ha potuto parlare a Maria, #ma non lo ha fatto.
Gianni can-pst-**pfv** talk to Maria but not it do-pst-pfv
'Gianni was able to talk to Maria, #but he didn't do it.'

(4) Gianni poteva parlare a Maria, ma non lo ha fatto.
Gianni can-pst-**impf** talk to Maria but not it do-pst-pfv
'Gianni was able to talk to Maria, but he didn't do it.'

I will first show that actuality entailments with *volere* involve the same ingredients as with root modals, and that the solution Hacquard (2006, 2007) offers for the latter can straightforwardly be extended to *volere*. Relating the implicative behavior of *volere* to that of root modals raises, however, a second question: if root modals' actuality entailments are to be found in many languages that have a morphological perfective/imperfective distinction, why don't the counterparts of *volere* in those languages also yield actuality entailments with perfective? As shown in the following example, French *vouloir* (*want*) is never implicative, regardless of aspect:

(5) Gianni a voulu parler à Maria, mais il ne lui a pas parlé.
Gianni want-pst-**pfv** talk to Maria but he NE her talk-pst-pfv

(6) Gianni voulait parler à Maria, mais il ne lui a pas parlé.
Gianni want-pst-**impf** talk to Maria but he NE her talk-pst-pfv
'Gianni wanted to talk to Maria, but he didn't do it.'

I will argue that what sets *volere* apart from its French (or Hindi) counterpart, and underlies its implicative behavior, is structural in nature: while both *volere* and *vouloir* share the same modal component (quantification over desire worlds), *volere*, unlike *vouloir*, is a 'Restructuring Predicate'. As such, I will argue, *volere* is not a verb (i.e., a

predicate of events), but rather a functional element, which forms a single clause with its complement, with just one tense and aspect projection, and thus a single event quantification. Thus, while (5) involves two events, a *wanting* event and a *talking* event, (1) describes a single event of *talking*, which occurs both in the actual world and in the desire worlds of the subject.

This paper will be organized as follows: in section 2, I will provide some background assumptions on the semantics of tense, aspect and desire predicates. Section 3 will be devoted to actuality entailments with root modals. In section 4, I will discuss restructuring and implicative properties of *volere* and show how to derive actuality entailments with *volere* in section 5.

2 Background Assumptions

In this section I first provide background assumptions on tense and aspect, and then discuss a standard semantics for *want*.

2.1 Semantics for *tense* and *aspect*

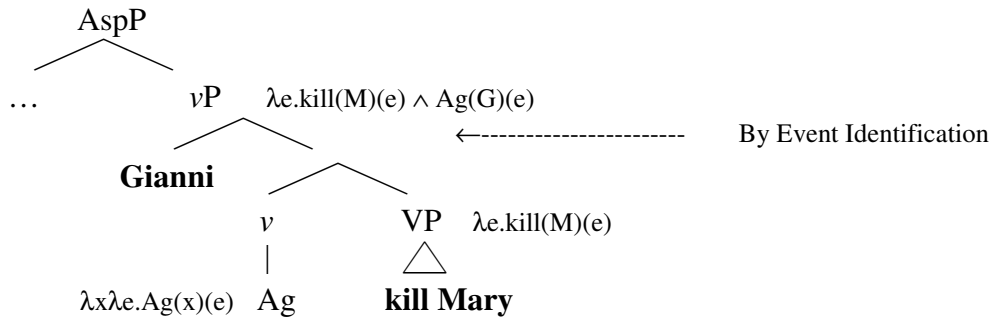
I assume that **Tenses** are referential (i.e., they are not parameters), and thus explicitly represented in the syntax (cf. Partee 1973). The following entries are from Kratzer (1998), where the overlap/anteriority relation with the speech time t* is given as a presupposition: the context has to provide a salient time interval t which overlaps/precedes the speech time:

(7) a. $[[\text{pres}]]^c$ only defined if c provides an interval $t \approx t^*$. If defined $[[\text{pres}]]^c = t$.
b. $[[\text{past}]]^c$ only defined if c provides an interval $t < t^*$. If defined $[[\text{past}]]^c = t$.

In the Davidsonian tradition, I take **verbs** to be predicates of events. Following Marantz (1984), and Kratzer (1996), I further assume that there is an asymmetry between the external and internal arguments of the verb, such that the external argument is not an argument of the verb, but is introduced via a *voice* projection (vP), headed by an Agent relation, which combines with the VP by a rule of Event Identification:

(8) a. $[[\text{kill}]] = \lambda x\, \lambda e.\ \text{kill}(x)(e)$
b. $[[\text{kill Mary}]] = \lambda e.\ \text{kill}(\text{Mary})(e)$
c. $[[\text{Agent}]] = \lambda e\, \lambda x.\ \text{Agent}(x)(e)$

(9)



Aspects are quantifiers over events; they locate the running time of the event described by the vP with respect to a reference time provided by Tense (cf. Klein 1994; Kratzer 1998). I will assume the following lexical entry for perfective aspect (from Hacquard 2007), according to which perfective existentially quantifies over the vP event, and locates its running time (t(e)) within a time interval t, later provided by tense. We will briefly turn to imperfective aspect in section 3.

(10) $[[\text{PERFECTIVE}]]^w = \lambda P_{<et>}.\lambda t_i.\ \exists e\ [e \text{ in } w \ \&\ t(e) \subseteq t \ \&\ P(e)]$

The following example illustrates a simple sentence:

(11) [[Gianni escaped]]^w = 1 iff ∃e[e in w & t(e)⊆t {t<t*} & e is an escape by G in w]
where {t<t*} is the presupposition of 'past'
'*There is an event contained in a salient past interval of Gianni escaping'*.

2.2 Semantics for *want*

In the Hintikka tradition, desire predicates are treated as universal quantifiers over possible worlds: worlds compatible with the desires of the subject. More precisely, attitude verbs like *want* (as opposed to *wish* or *would like*) have been argued to quantify over desirable doxastic alternatives of the subject, as opposed to mere desire worlds (cf. Heim 1992, Portner 1994, Giorgi and Pianesi 1997, a.o). To illustrate this point, consider the following pairs of sentences, where the infelicity of (a) shows that *to want p*, *p* has to be compatible with the subject's beliefs: (For more detailed arguments, notably some involving presupposition projection facts, see Heim 1992):

(12) a. #Gianni wants the Earth to be flat.
b. Gianni would like the Earth to be flat.

To formalize this insight, we take *want* to quantify over doxastic alternatives of the subject, further ordered by a bouletic ordering source (the following entry is adapted from von Fintel 1999), where $\text{BEST}_{\text{desire}}$ picks out the most desirable worlds, as determined by the bouletic ordering source (*desire*), among the doxastic alternatives of the subject:

(13) $[[\text{x want p}]]^w = 1$ iff $\forall w' \in \text{BEST}_{desire}(\text{DOX}(x,w))$: $p(w')$

Lastly, *want* is a verb and, like other verbs, it should be treated as a predicate of events: it needs to be in the scope of Tense (for instance to yield past desires), and to combine with Aspect (to provide quantification over its event argument). I thus propose to modify the above entry, as to give *want* an event argument. Note that, as stated in the preceding section, I assume that the external argument (the agent of the *wanting* event) will later combine with the VP via a *voice* projection:

(13') $[[\text{want}]]^w = \lambda p.\ \lambda e.\ \text{want}(e)\ \&\ \forall w' \in \text{BEST}_{desire}(\text{DOX}(\text{Ag}(e),\tau(e),w))$: $p(w')$

The following example illustrates. Note that in this English sentence, the complement clause seems future-oriented (the escaping event happens in the future of the wanting event). For reasons of space, I'll simply assume, without giving a precise treatment, that, because the complement of *want* is a full proposition, we could add a covert future tense in the complement clause:

(14) a. Gianni wanted to escape.
b. $[_{TP}$ T [perf [want [$[_{TP}$ G. escape]]]]]
c. $[[(a)]]^w = 1$ iff $\exists e_1[\ e_1$ in w & $t(e_1) \subseteq t\{t<t^*\}$ & e_1 is a wanting by G., s.t. in $\forall w' \in \text{BEST}_{desire}(\text{DOX}(G,\tau(e),w))$: $\exists e_2[e_2$ is an escape by G in w']]
d. '*There is a past wanting event by Gianni, s.t. in all of his most desirable doxastic alternatives at that wanting time, there is an event of G. escaping.*'

We see that we obtain an escaping event by Gianni in all of his desire worlds. These truth conditions do not imply that Gianni does (or will) escape *in the actual world*. This is exactly what we want for English (or French or Hindi...): a sentence like '*John wanted to escape, but he never did'* is not a contradiction. However, this cannot account for the implicative behavior of Italian *volere*. Recall that, as illustrated in examples like (1), repeated below, the complement of *volere* with perfective aspect seems to be forced to hold in the actual world:

(15) Gianni ha voluto parlare a Maria, #ma non lo ha fatto.
Gianni want-pst-**pfv** talk to Maria but not it do-pst-pfv
'Gianni wanted to talk to Maria, #but he didn't do it.'

As mentioned in the introduction, this behavior is reminescent of Bhatt's *actuality entailments* with perfective on root modals, to which we now turn to.

3 Actuality entailments with root modals

We saw in the introduction that root modals behave like implicative predicates (their complement is entailed to hold in the actual world) with perfective aspect, but not imperfective (Bhatt 1999). Examples (1) and (2) are repeated below:

(16) Gianni ha potuto parlare a Maria, #ma non lo ha fatto.
Gianni can-pst-**pfv** talk to Maria but not it do-pst-pfv
'Gianni was able to talk to Maria, #but he didn't do it.'

(17) Gianni poteva parlare a Maria, ma non lo ha fatto.
Gianni can-pst-**impf** talk to Maria but not it do-pst-pfv
'Gianni was able to talk to Maria, but he didn't do it.'

In this section, I will go over the proposal I offered in Hacquard (2006, 2007) to explain this data. There, I argued that actuality entailments arise in a particular configuration of aspect and a modal element, namely, when aspect takes scope over a modal (which happens when the modal receives a root interpretation, as opposed to an epistemic one), and when no other modal element takes scope above it. This is so because Aspect is anchored to a world of evaluation (cf. (9), repeated below, where the relevant anchoring is in boldface):

(18) $[[\text{PERFECTIVE}]]^{w} = \lambda P_{<et>}.\lambda t_i.\ \exists e\ [\mathbf{e\ in\ w}\ \&\ t(e) \subseteq t\ \&\ P(e)]$

When aspect is outside the scope of the modal, its world argument is the matrix world of evaluation (the actual world), thus the event it quantifies over has to occur in the actual world, thereby yielding an actual event. Hacquard (2007) assumes that root modals are merged below tense and aspect (cf. Cinque 1999, Brennan 1993, Butler 2003): they take a predicate of events and return a predicate of events:

(19) $[[\text{can}_{\text{root}}]]^{w} = \lambda P_{<set>}.\lambda e.\ \exists w'$ compatible with circumstances in w s.t. $P(w')(e)$

Putting these elements together in a sentence, we obtain an actuality entailment as follows:

(20) $[[(16)]]^{w} = 1$ iff $\exists e[e$ in w & $\tau(e) \subseteq t\{t<t^*\}$ & $\exists w'$ compatible with circumstances in w s.t. e is a talk-to M. by G. in $w']$
'*There is an **actual event** located in a past interval which, in some world compatible with the circumstances is an event of talking to Maria by Gianni.*'

Now, what the truth conditions in (20) tell us is that there was an actual event, which, in *some* accessible world, is an event of talking to Maria. We are not yet getting an actual event *of* talking to Maria. To get the full actuality entailment, Hacquard (2007) proposes the principle of Event Identification across Worlds in (21), which relies on the

assumption that the same event will receive the same description across worlds, unless otherwise indicated (as in the case of counterfactuals, which are usually marked with particular morphology, e.g., subjunctive or *conditionnel*):

(21) **Event Identification across Worlds:**
For any w_1, w_2, if an event *e* occurs in w_1 and w_2, and *e* is a P-event in w_1, it is a P-event in w_2 as well.

Assuming that such a principle holds, we obtain an actuality entailment for (16) as follows: we know that *e* occurs in w* (via the world assigned to aspect). We further know that *e* is a talking_to_Maria event in some world w. We therefore conclude that that same *e* is a talking_to_Maria event in w*. In section 5, we will return to some evidence that such a principle holds, after we discuss the case of *volere*.

The last puzzle that needs to be resolved is the lack of actuality entailments with imperfective aspect. If imperfective worked exactly like the perfective, and only differed in durational properties it assigns to the event it quantifies over, we should expect actuality entailments there as well. But, as (17) illustrates, this is not the case. However, it has been shown that imperfective morphology is cross-linguistically (and independently of these facts) associated with a modal element (e.g., progressive, counterfactual, generic; cf. Bhatt 1999, Cipria & Roberts 2000, Ippolito 2004, Hacquard 2006, a.o.). Following Bhatt (1999), Hacquard (2006, 2007) takes the imperfective to reflect the presence of an additional modal operator e.g., a counterfactual modal. A counterfactual modal picks out worlds as similar as possible to the actual world, in which an (antecedent) if-clause holds (cf. Lewis 1973). This modal takes scope over aspect, and thereby anchors the event to the worlds it quantifies over. We obtain an event of talking to Maria in all counterfactual worlds (e.g., worlds as similar as possible to the actual world, but where Gianni had a desire to talk to Maria), but, crucially, not necessarily in the actual world; hence we avoid an actuality entailment:

(22) a. (Se lo voleva,) Gianni poteva parlare a Maria, ma non lo ha fatto.
b. (If he wanted to,) Gianni can-past-**impf** talk to M., but not it do-past-pfv.
c. $[_{ModP}$ **CF$_2$** $[_{TP}$ past $[_{AspP}$ Asp$_1$ **w$_2$** $[_{ModP}$ can$_3$ $[_{VP}$ talk-to-M.-by-G.$(w_3)(e_1)$]]]]
d. *'In all counterfactual worlds w (similar to the actual world, but where G. wants to talk to M.), there is a past event, which in some world compatible with the circumstances in those counterfactual worlds is an event of talking to M. by G.'*

We thus see that the recipe for actuality entailments with a modal involve three main ingredients: (i) a particular configuration of aspect and a modal (the aspect quantifying over the vP event has to scope over the modal element); (ii) some principle of event identification across worlds that allows the same event to keep its description across worlds; (iii) a lack of any other modal element above aspect. We now turn to *volere* to see how we could apply the same recipe.

4 Restructuring and implicative properties of *volere*

In this section we will look at what sets Italian *volere* from its counterpart in a language like French that might explain why the former, but not the latter, behaves like a root modal. The crucial difference I would like to exploit is that *volere*, unlike *vouloir*, is a 'Restructuring Predicate' (RP). The term *Restructuring* (Rizzi 1978) applies to those constructions where the infinitival complement 'appears to be a transparent domain for syntactic phenomena that are otherwise quite local (clause bound)' (Wurmbrand 2001: 1). I will hypothesize that *volere* is not a verb (i.e., a predicate of events), but just a functional head (like a modal), and that as a RP, it shares a single tense and aspect projection with its complement, while *vouloir*, as a full verb, takes its own event argument, and lets its complement have its own tense and aspect projection, as schematized below:

(23) **Italian**: T Asp_1 *volere* $VP(e_1)$
French: T Asp_1 *vouloir*(e_1) T Asp_2 $VP(e_2)$

4.1 Restructuring predicates and their complement form a single clause

In this section, we will look at evidence from the literature that Restructuring Predicates form a single clause with their complement. Two phenomena that seem to argue for this single clause architecture in Italian are '*clitic-climbing*', where a clitic pronoun selected as the object of the embedded VP can appear before the RP (24), and '*auxiliary switch*', where the auxiliary that appears in the matrix is sensitive to the type of verb in the complement clause. As (25) shows, when an unaccusative verb—which selects for auxiliary *be* both in French and in Italian—appears in the complement of *volere*, it is auxiliary *be* that appears in the matrix, while *vouloir* always takes auxiliary *have*, regardless of the type of verb that appears in the complement:

(24) a. Gianni la vuole sposare. (Italian)
b. *Gianni la veut épouser. (French)
Gianni her wants marry
'Gianni wants to marry her.'

(25) a. Gianni **è** voluto andare. (Italian)
Gianni **is** wanted leave
a'. Gianni **a** voulu partir. (French)
Gianni **has** wanted leave
'Gianni wanted to leave.'
b. Gianni **ha** voluto mangiare. (Italian)
Gianni **has** wanted eat
b'. Gianni **a** voulu manger. (French)
Gianni **has** wanted eat
'Gianni wanted to eat.'

Wurmbrand (2001) takes these kind of phenomena to argue that a sentence with a RP is monoclausal. It involves a unique functional part, that is, a single CP, TP, and vP layer. As we will see in section 4.3, I will further assume that they involve a single Aspect Phrase as well. Before turning to some evidence that *volere*, unlike *vouloir*, contains a single tense and aspect projection, I first want to show that the difference between *volere* and *vouloir* that is responsible for their difference in implicative behavior is tied to restructuring, as opposed to, say, some general difference in the semantics of French and Italian desideratives. *Restructuring* seems necessary for actuality entailments: First, other Italian non-restructuring desiderative predicates, illustrated in (26), don't yield actuality entailments. Furthermore, when *volere* takes a CP (subjunctive) complement, as shown in (27), it doesn't behave like a RP (no clitic climbing nor auxiliary switch allowed), and doesn't yield actuality entailments either[1]:

(26) a. Gianni ha desiderato parlare a Maria, ma non lo ha fatto.
Gianni desire-pst-pfv talk to Maria, but not it did-past-pfv.
'Gianni desired to talk to Maria, but he didn't do it.'
b. Gianni ha avuto voglia di parlare a Maria, ma non lo ha fatto.
Gianni has-past-pfv want to talk to Maria, but not it did-pst-pfv.
'Gianni had want to talk to Maria, but he didn't do it.'

(27) Gianni ha voluto che piovesse, ma non ha piovuto.
Gianni wanted-pfv that rain-subj, but not rain-pst-pfv.

This data seems to indicate that actuality entailments with *volere* are due to structural, and not purely semantic factors.

4.2 Single tense and single aspect projection

RP seem to involve a single Tense projection (Wurmbrand 2001). Unlike its French counterpart (28), or other desiderative predicates that are not restructuring predicates (29), with *volere*, the embedded event cannot be located at a different time than the matrix event (30). Consider the following scenario: Gianni can't make up his mind about when to go on vacation. A month ago, he wanted to leave last week, and then…

(28) Il y a une semaine, Gianni a voulu partir le lendemain. (French)
A week ago, Gianni wanted-pfv leave the next day.

(29) Una settimana fa Gianni ha desiderato partire il giorno dopo. (Italian)
A week ago, Gianni desired-pfv leave the next day.

(30) *Una settimana fa Gianni è voluto partire il giorno dopo. (Italian)
A week ago, Gianni wanted-pfv leave the next day.

[1]For some Italian speakers, sentences like (27), while not as bad as those like (15), are not perfect. I leave a more detailed investigation of sentences with subjunctive complements for future research.

I would now like to argue that *volere* and its complement share a single aspect projection. A sentence with a restructuring predicate like *volere*, unlike *want* or *vouloir*, seems to involve only ONE event. To see this, we need to consider scenarios involving the adverb *again*. *Again* takes a predicate of events P and an event *e* and presupposes the existence of a prior P-event (von Stechow 1996, Beck and Johnson 2002):

(31) $[[\text{again}]](P_{<\varepsilon,t>})(e)$ = 1 if P(e) & ∃e'[e'<e & P(e')]
= 0 if ~P(e) & ∃e'[e'<e & P(e')]
undefined otherwise

Consider the following scenarios (adapted from Wurmband 2001)[2]:

(32) **Scenario 1**: Gianni and Maria eloped in their twenties. The honeymoon over, they quickly became disenchanted and divorced. Years later, Gianni realized that Maria was the woman of his life and…

(33) **Scenario 2**: Gianni fell in love with Maria and wanted to marry her, but before he could propose, she moved to another country. Years later, he saw her again and...

(34) Gianni a voulu épouser Maria à nouveau. (French)
Gianni wanted-pfv marry Maria again.

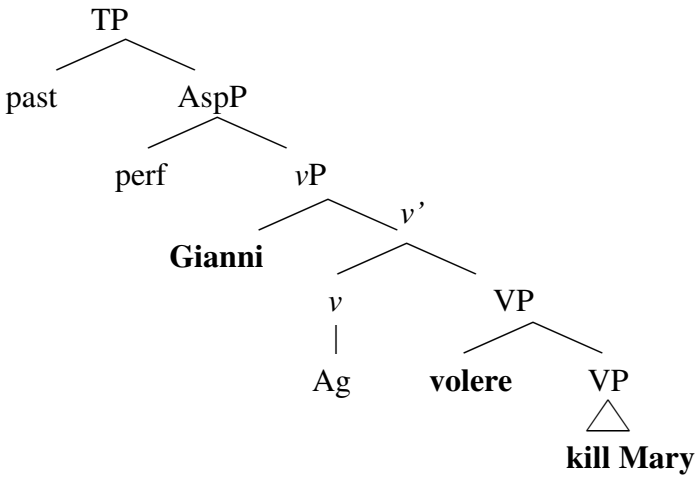
(34) is compatible with both scenarios, showing that when *again* modifies *want/vouloir*, it licenses two possible prior events (previous marriage or previous desire). However, when *again* modifies *volere* with perfective aspect, scenario 2 is incompatible with (35): one can only generate a previous marriage presupposition:

(35) Gianni ha voluto sposare Maria di nuovo. (Italian)
Gianni wanted-pfv to marry Maria again.

It thus appears that, unlike its counterparts in other languages, *volere p*, being a restructuring construction, only involves a single Tense and Aspect projection. Why should this be? I would like to claim that this is because *volere* is not a verb: this is why it doesn't select its own auxiliary. Instead, *volere* (like a root modal) combines with a predicate of events (VP), via *Intensional Functional Application* (cf. Heim & Kratzer 1998) and returns a predicate of events (VP), as shown below:

[2]The argument using *again* is inspired by Wurmbrand (2001). However, Wurmbrand uses *again* to argue that RP involves *2* events. Her examples use present tense on *volere*, which, I believe, involves an additional modal layer (*per* imperfective), in turn responsible for the illusion of a second event. For discussion, see Hacquard 2006.

(36)



I thus propose the lexical entry in (37), which minimally differs from the one in (13') for *want* (repeated in (38)) in that *want* takes an event argument, and a proposition complement, while *volere* takes a predicate of events as its sole argument:

(37) $[[\text{volere}]]^w = \lambda P_{<set>}.\ \lambda e.\ \forall w' \in \text{BEST}_{desire}(\text{DOX}(\text{Ag}(e),\tau(e),w)): P(w')(e)$

(38) $[[\text{want}]]^w = \lambda p.\lambda e.\ \text{want}(e) \ \&\ \forall w' \in \text{BEST}_{desire}(\text{DOX}(\text{Ag}(e),\tau(e),w)): p(w')$

5 Deriving actuality entailments with *volere*

Now that we have a lexical entry for *volere*, let us see what happens when we combine it with perfective aspect:

(39) a. Gianni ha voluto parlare a Maria.
'Gianni wanted to talk to Maria.'

b. $[[\ [_{VP}\ \text{volere}\ [_{VP}\ \text{talk to M.}]\ ]]^w = [[\text{volere}]]^w(\lambda w'.\ [[\text{talk to M.}]]^{w'})$ *(by IFA)*
$= \lambda e.\forall w' \in \text{BEST}_{desire}(\text{DOX}(\text{Ag}(e),\tau(e),w))$: e is a talk to M. in w'

c. $[[(a)]]^w = 1$ iff $\exists e[e \text{ in } w \ \&\ \tau(e) \subseteq t\ \{t<t^*\}$ & Gianni is the agent of e s.t.:
$\forall w' \in \text{BEST}_{desire}(\text{DOX}(G.,\tau(e),w))$: e is a talk to M. in w']
There was an actual event by Gianni which in all of his most desirable doxastic alternatives was a talking to Maria event.

We obtain an **actual** past event by Gianni, which in all of his desire worlds is an event of talking_to_Maria, in the same way we obtained an actual event with root modals. We further obtain that this actual event is a talking_to_Maria, via the Event Identification across Worlds Principle in (21), repeated below:

(40) **Event Identification across Worlds:**
For any w_1, w_2, if an event *e* occurs in w_1 and w_2, and *e* is a P-event in w_1, it is a P-event in w_2 as well.

Finally, we can further derive a lack of actuality entailments with imperfective by invoking, as we did for root modals, the extra layer of modality associated with imperfective morphology. In the following example, we take this extra modal element to be a counterfactual modal:

(41) a. Gianni voleva parlare a Maria (se lei avesse avuto tempo).
b. Gianni want-past-**impf** talk to Maria (if she had had time).
c. $[_{ModP}$ **CF$_2$** $[_{TP}$ past $[_{AspP}$ Asp$_1$ **w$_2$** $[_{VP}$ volere$_3$ $[_{VP}$ talk-to-M.$(w_3)(e_1)$]]]]
d. *'In all counterfactual worlds w (which are as similar to the actual world, but where Maria has time to talk), there is a past event by Gianni, which in all of his most desirable doxastic alternatives in those counterfactual worlds is an event of talking to Maria'*

We obtain an event of Gianni talking to Maria in all of the counterfactual worlds. This does **not** imply that Gianni did or will talk to Maria in the actual world, hence we avoid an actuality entailment. Note that this sentence still only involves a single event. However, crucially, this single event doesn't have to occur in the actual world.

The upshot of my proposal can be summarized as follows. What underlies actuality entailments with root modals and *volere* is a particular configuration between aspect and the modal element. When aspect takes scope over a root modal/*volere*, it yields an actual event, unless some additional modal takes scope over aspect. This, however, crucially relies on the Event Identification principle: the actual event has the same description in the actual world as it does in the accessible worlds in which it also occurs. In the remaining of this section, I will provide further support for this principle with scenarios that force a violation of the principle of Event Identification. This happens when the description of the event in the desire worlds doesn't match that of the event in the actual world. As we will see, in these cases, it won't be possible to use a sentence with *volere* with perfective aspect. Instead, we will need some counterfactual marking to indicate the mismatch in event descriptions.

As argued for *want* in section 2.2., *volere* quantifies over doxastic alternatives of the subject (belief worlds of the subject). What we want to explore here is what happens when the event denoted by the embedded VP doesn't have the same properties in the actual world as in the subject's doxastic alternatives. Consider the following scenario:

(42) **Scenario 1**: Gianni is in a very good vegetarian restaurant. He looks at the table over and tells the waitress that he wants the same dish, which he thinks is meat, but is actually tofu. He eats it to the last bit.

Given this scenario, we see that the event in the actual world can be described as an

event of *eating tofu*. In Gianni's doxastic alternatives, however, this event should be one of *eating meat*. There is thus a mismatch in the descriptions of the same event. As shown in (43), this mismatch leads to ineffability: it is neither possible to describe the event as a meat_eating, nor as a tofu_eating event.

(43) a. #Gianni ha voluto mangiare della carne, (ma si trattava di tofu).
Gianni wanted-pfv eat meat, (but it was tofu).
b. #Gianni ha voluto mangiare del tofu.
Gianni wanted-pfv eat tofu.

The following scenario makes the same point:

(44) **Scenario 2**: Gianni is convinced the French president is responsible for all of the world's misery, and decides to kill him. He, however, thinks that George W. (who, we all know, is actually the American president) is the French president. He goes to the G8 meeting and kills George W.

Here again there is a mismatch in the description of the same event in the actual world and in Gianni's doxastic alternatives: in the actual world, George W is the US President and the event is an event of killing the US President; in Gianni's doxastic alteratives, George W is the French president, and the event is an event of killing the French president. As (45) shows, neither (a) nor (b) is expressable in Italian.

(45) a. #Gianni ha voluto assassinare il presidente francese.
Gianni wanted to kill the French President.
b. #Gianni ha voluto assassinare il presidente americano.
Gianni wanted to kill the American President.

Note that, given these scenarios, in order to express a valid sentence, one would need some counterfactual morphological marking, which seems necessary in order to indicate that there is a mismatch in event descriptions across worlds. In Italian, counterfactuality is expressed either by the *conditionnel* mood, or, as we saw earlier, by the imperfective (cf. Ippolito 2004):

(46) Gianni voleva assassinare il presidente francese, ma ha assassinato quello americano.
Gianni wanted-**impf** kill the French president, but he killed the American one.

These facts seem to lend support to the principle of Event Identification across Worlds, such as the one proposed in (21). Such a principle may, at first blush, appear to overgenerate (cf. Hacquard 2007), in the face of counterfactuals, given that their very function seems to be to give the same events or individuals (or counterparts of these events or individuals under a Lewisian view) different descriptions across worlds.

However, data like (43)-(46) show that mismatches in description across worlds are the marked case, and require special morphology.

6 Conclusion

In this paper, I have hoped to show that the implicative behavior of *volere* is structural in essence and derives from the same factors underlying other restructuring phenomena: it shares with its complement a single tense and aspect projection. While a sentence with its French (and English) equivalent involves 2 event quantifications (2 aspects), *volere p* involves a single one: we obtain one *p* event, in the actual world and in all of the subject's desire worlds. Finally, the lack of actuality entailments with imperfective can be argued to arise from an additional layer of modality associated with imperfective morphology, as has been argued to be the case for root modals (Bhatt 1999, Hacquard 2006).

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Number, (In)definiteness and Norwegian Nouns*

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Abstract

The Norwegian bare plural may help clarify the distinction between subjects of generic and true kind predicates since it may be used as the former, but not as the latter. Its interpretational and distributional properties are furthermore outnumbered by the truly bare Norwegian N which may be subject of both kinds and generics in addition to functioning as a nominal predicate. I cement the fact that the Norwegian bare plural is inherently indefinite, and propose that the properties of the truly bare N may be given a unified account if analysed as marked for general number rather than as an indefinite singular.

1 Introduction

Norwegian displays the cross-linguistically rare distinction between true kind and generic predicates since its bare, or indefinite, plural may function as the subject of the latter, but crucially not of the former. That a language makes this distinction is unexpected in most recent analyses which derive generics directly from kinds. Also the truly bare Norwegian noun deserves attention. It has a wider distribution than the bare plural – including the possibility of taking both generic and true kind predicates. The two Norwegian N-forms seen in (1) and (2) are thus highly interesting for the 30 year old debate (Carlson, 1977) on the meaning and interpretation of bare nouns, and the different possible expressions of kind reference and genericity.

(1) ***Elger/elg*** *har fire bein.*
Elks/elk have four legs.

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(2) **Elger/elg er ikke utrydningstruet (i Norge).*
Elks/elk are not threatened (in Norway).

In order to give a unified understanding of the distribution, meaning and interpretation of these two (so called) bare or non-definite Norwegian N-forms, I present two major proposals: (i) instead of being an indefinite singular, the truly bare noun bears general number (Corbett 2000), and is undefined with regard to definiteness, and (ii) that the Norwegian bare plural, contrarily to the English one, really is a true indefinite, and not just unmarked with regard to definiteness. The investigation is part of a bigger project on the relationship between form and meaning in the Norwegian nominal system.

The paper is structured as follows: Section 2 is an introduction to the neo-saussurean framework in which the investigation is set. Section 3 presents the analysis. 3.1 gives a short crash-course in the Norwegian nominal system, while 3.2 and 3.3 presents the two n-forms that are subject of the paper. Section 4 gives a short conclusion.

2 Framework – neo-saussurean grammar

Section 2.1 discusses saussurean arbitrariness and 2.2 the relationship between form, meaning and interpretation from a neo-saussurean view-point. Section 2.3 presents Bouchards (2002) analysis of number and variation in English and French with a special focus on the three interpretations of the English bare plural, an analysis that will be adapted in the search for the grammar semantics of the two non-definite Norwegian nouns.

2.1 Arbitrariness

In neo-saussurean grammar, arbitrariness as an omnipresent and fundamental property of language, is seen as responsible both for the relationship between meaning and form and the possibilities of linguistic variation, and is restricted only by limitations arising from the fact that language is set in human brains and bodies. Furthermore, arbitrariness is pervasive and holds both for all parts of the sign, and for all kinds of signs. Saussurean arbitrariness is thus not only limited by the fact that there are no determined sounds waiting to be matched with meanings i.e. to the *signifiant*, but also to the fact that there are no predetermined meanings waiting to be matched with a sound, i.e. there are (in principle) no universally established *signifiés*. Exceptions to this are the *signifié* of relations between signs, which I, following Bouchard (2007, ms UQAM), univocally take to be predication (in the widest sense possible of the term) and the list of universal semantic primitives elaborated by Anna Wierzbicka and her followers (e.g. Wierzbicka, 1972; 1996; 2006). The first is a consequence of human categorization, while the latter is grounded not in human biology, but in sociology.

All linguistic units are signs, and a sign may thus be as small as the simplest morpheme or as big as the most complex of sentences. Arbitrariness scope over not only the lexical level of meaning, but also over grammatical meanings, the meaning of complex signs, and even the expression of relations between signs – including syntax – the latter being the only area where arbitrariness is limited by 'relative motivation'. Since signs are arbitrary, we expect language variation not only with regard to the choice of what conceptual categories are grammaticalized and/or lexicalized in a language, but also with regard to how these categories are expressed, and to what the value of their expression is. However, once a choice is set, it has profound consequences.

2.2 Form, meaning, interpretation

With its one-to-one relationship between form and meaning, the use of the sign as the basic linguistic unit requires a sharp distinction between context and background knowledge on the one hand, and what Bouchard (1995) terms Grammar Semantics on the other. The invaried, abstract grammatical meaning of a lexical item - including a sentence – may be strongly distinct from all the various *interpretations* the same item might receive. Most cases of polysemy and homonymy may, thus, be reduced to interpretational differences. The fact that one meaning may yield (highly) different interpretations, and that similar interpretations may arise from different meanings, does not pose parsing or efficiency problems since language users (maximally) exploit the ever-present linguistic and extra-linguistic context. And since no sign is uttered out of context, no sign is ever interpreted in isolation.

2.3 Number and variation in English and French, Bouchard (2002)

Bouchard (2002) explains most important differences in the nominal domain of French and English by exploring the idea that Number is semantically encoded on the determiner in French and on the noun in English. This simple difference is accounted for by the fact that number – if at all grammaticalized in a language, may equally well be marked on the noun as on the determiner, or on a separate number lexeme. These alternative realizations of number is shown to motivate (i) the variation in adjectival modification – preposed in English, both pre- and postposed in French – including the subtle interpretational distinctions found there, (ii) the use of lone argumental determiners (i.e. pronominal clitics) and predicative bare nouns, both impossible in English but fine in French, and (iii) the wider use of bare argumental noun phrases in English.

The lack of bare arguments in French is a consequence of the assumed absence of number marking on the French N altogether – since lack of number marking is seen as entailing non-referentiality.[1] At the same time, it is this non-referentiality of the French

[1]Both Bouchard and myself are of course aware of the fact that bare French Ns may appear in argument positions under specific circumstances – these may nevertheless all be understood as non-referentials, or

N that allows its bare use as a nominal predicate. The unavailability for this use of the English singular is, likewise, explained by the fact that the English N always is referential since it obligatorily marks number, which in turn is what enables it to function as a full argument.

To understand Bouchard's proposal for the three possible readings of the English plural – made famous by Carlson and presented below – a short presentation of his view of the semantic import of the category of number is needed. Example (3) is Bouchard's (77).

(3) a. Beavers are on the verge of extinction. (kind)
b. Cats are mammals. (generic)
c. Dogs are barking outside. (weak indefinite, episodic predicate).

For Bouchard (following (Link, 1983) and (Landman, 1991), see also (Chierchia, 1998)), the semantic contribution of number is twofold. Number can atomize the superset defined by the property of the N and provide access to ordinary singular individuals, and Number can indicate that the sort of individual involved is a plural or a singular individual (Bouchard, 2002: 308). The English plural suffix on the N is taken to contribute both 'types' of number, while in e.g. Italian the plural suffix only indicates a *plural individual* without atomisation to particulars, leaving the last part to the determiner. The pluralization of an English N, since involving atomisation, is further understood as giving access to the entire domain of plural interpretation, including both plural individuals and ordinary singular individuals.

The kind-interpretation is obtained from the idealized superset – denoting all occurrences as a whole. The availability of this is due to the fact that reference tends to be as wide as possible (see Kleiber, 1981), which, when no (contextual) restrictions are available, translates into maximality for plurals and uniqueness for singulars. Reference to the superset is also often achieved by a definite singular form – and in some languages, including Norwegian and French, also with an explicit definite plural. As for generics, while stating a fact of a kind may be interpreted as a generalization, the generic readings may also be obtained independently of the direct kind reference, namely by applying the predication distributively to the singular entities of which the kind is made up. The weak indefinite reading of the bare English plural arises, again according to Bouchard, when the plural-suffix provides access to individuals that are pluralities rather than to a plurality of singular individuals. That Italian bare plurals only allow the weak indefinite reading therefore follows naturally, since the Italian plural suffix only contributes this latter semantics. The same line of reasoning is used to account for mass readings of the English singular, which are described as unatomized singularities "presented as an object having the property of the N, but not instantiated in an individual, i.e., as non-individuated mass." (2002: 305). The lack of most of these

shown to get their referentiality set otherwise. For a thorough presentation on the conditions allowing determiners to be absent in French see (Curat, 1999).

readings for bare French Ns is accounted for by the absence of semantic number marking altogether.

For Bouchard, the nominalization effect (Chierchia, 1998) found with English nouns is a direct consequence of its number marking, and there is thus no need to make recourse to any kind of abstract operator. Bouchard's analysis is neo-Carlsonian: it preserves the main findings of Carlson's original proposal, such as the unified understanding of the English plural, and the idea that the choice between its three readings is made inferentially and determined by context. Since Bouchard assumes quite a different framework, his analysis nevertheless diverges from this tradition on several fundamental points like the view of language universals, the relationship between form, meaning and interpretation and thus also on the extent of language variation. For more information on the neo-saussurean framework readers are referred to the two saussurean canon (Saussure et al., 2002) and (Saussure et al., 1916 (1968)), and to recent works of Denis Bouchard (2002; 2005), see also (Shaumyan, 2006). For more specific discussions of the differences between neo-saussurean and other current linguistic theories see the *Lingua* debate with Bouchard (2005; 2006a; 2006b), Newmeyer (2005), Breheny and Adger (2005), Crain and Pietroski (2006) and Boeckx (2005).

3 Norwegian Nouns

Section 3.1 gives some background on the Norwegian nominal system. 3.2 deals with the NIP. 3.2.1 presents its distributional and interpretational range, before its properties as a diagnostic for kind reference are given in 3.2.2. Section 3.2.3 proposes to regard this NIP as truly indefinite, and presents some further support for such an analysis. The NBN is discussed in 3.3. Section 3.3.1 presents its distributional and interpretational range in contrast with both French and English bare nouns. 3.3.2 presents the analysis of the NBN as bearing general number and as being undefined with regard to definiteness, an idea that gets both intra- and cross-linguistical support from its agreement properties in 3.3.3.

3.1 Norwegian crash course

Norwegian is a rigid word order, head first, SVO, V2 language with a very limited verbal morphology. There are only 3 finite forms (pres, past, imp), and no nominal agreement or inflections (i.e. person, gender, number, (in)definiteness) in the verbal system. The language further has no pure articles – i.e. except for the suffixes, all determiners are pronominal. Adjectives are normally preposed, but post-modified adjectives group with other NP-modifiers like PPs, rel-clauses and infinitivals in being postposed in accordance with the head-first setting. There is no (overt) Case (except for personal pronouns). Gender- m, f, n - is covert on the bare N, but surfaces as (inter-phrasal) agreement on adjectives and articles/pronouns.

Norwegian Ns mark, by the means of suffixes, for the categories of number – with a singular/plural distinction – and (in)definiteness, and most lexical nouns thus have four morphological forms. An exemple of each of these forms used in a sentence is given below:[2]

(4) a. *Alle i Norge har (en)* ***elg*** *i hagen.* (gle)
all in Norway have (an-M,SG) elk-M in the garden
'Everybody in Norway has an elk in their garden.'
b. *Jeg vet at det fins* ***elger*** *her.* (eld 9)
I know that there exist elk-PL,INDEF here.
'I know there are elks here.'
c. ***Elgen*** *er det største pattedyret i Norge.* (gle)
elk-M,SG,DEF is the biggest mammal in Norway
'The elk is the biggest mammal in Norway.'
d. ***Elgene*** *var så tamme at vi kunne klappe dem.* (gle)
elk-PL,DEF were so tame that we could clap them
'The elks were so tame that we could pat them.'

Throughout the rest of the paper these forms will be referred to as the Norwegian bare noun (NBN), the Norwegian indefinite plural (NIP) *-er*, the Norwegian definite singular (NDS) *-en*, and the Norwegian definite plural (NDP) *-ene* respectively

3.2 Norwegian indefinite plurals

3.2.1 Properties of NIPs – distribution and interpretation

Like the English bare plural, the NIP may occupy all major syntactic functions and allways takes narow scope. (5) give examples of the NIP as a subject, a direct object, an indirect object and as a prepositional complement.

(5) a. *Jeg trodde* ***elger*** *var mer selvstendige.* (eld 18)
I thought elks were more independent.
b. *Det er forbudt å kaste* ***elger*** *ut fra et fly.* (gle)
It is forbidden to throw elks out from a plane.
c. *Det er forbudt å servere* ***elger*** *alkoholholdige drikker.* (gle)
It is forbidden to serve elks alcoholic drinks.
d. *Det fins grenser for hva jeg gidder å ta imot fra* ***elger***. (eld12)
There are limits on how much crap I can stand from elks.

The NIP may further receive both weak indefinite (6) and generic interpretations (7):

[2]Examples are either google-matches – marked (gle) – or taken from diverse novels (eld), (ell) and (hub) standing for Erlend Loe's *Doppler* (2004) and *Volvo lastvagnar* (2006) and Helene Uri's *De beste blant oss* (2006) respectively. Examples where no source is indicated are my own creations.

(6) a. *Det er **elger** i hagen.*
There are elks in the garden.
b. *Kjøpte du **lyspærer/poteter**?*
Did you buy light bulbs/potatoes?

(7) a. ***Elger** er pattedyr/har fire bein.*
Elks are mammals/have four legs.
b. ***Lyspærer** avgir mye varme.* (gle)
Light bulbs produce much heat.

but unlike the English plural, the NIP is unable to combine with true kind-predicates:

(8) a. ***#Elger** står ikke i fare for å bli utryddet.*
Elks are not in danger of extinction
b. *#Edison oppfant **Lyspærer**.*
Edison invented light bulbs.
c. *# **Poteter** kom til Norge først på 1600-tallet.*
Potatoes were introduced in Norway in the 17th century.

Note that the examples in (8) are not strictly ungrammatical, just inappropriate for the intended kind reading.[3] The (b) version may receive a generic reading with an interpretation stating that Edison had the habit of inventing light-bulbs (a new one twice a week), while (8a) might get a taxonomic kind-reading. Like in French, true kinds are definite – either singular or plural.

(9) a. ***Elgen/Elgene** er utrydningstruet.*
The elk/elks is/are in danger of extinction.
c. ***Lyspæra/ Lyspærene** ble oppfunnet av Edison.*
The light-bulb/light-bulbs was/were invented by Edison.

While the NIP is fine both with a weak indefinite and a generic reading, it is unable to obtain a true kind-reading. The distinction between these three readings for the English bare plural has remained undisputed for 30 years (Carlson 77). Nevertheless, no real agreement seems to have been reached exactly on what constitutes a true kind predicate or where to draw the lines between kind and generic readings – even though an honourable effort was provided by Krifka et al. (1995). For instance, even if everybody seems to agree that predicates like *be extinct/invented* require a kind reading of the subject and e.g. *are magnificent animals* a generic one, predicates of the type *are mammals* may in the literature sometimes be understood as belonging to either of the two groups. In the following section, the distribution of the NIP is useed to help clarify this distinction.

[3]The use of "#" instead of "*" is meant to indicate this. For strictly ungrammatical sequences the conventional "*" will be used.

3.2.2 NIPs as a diagnostic for kind reference

As already mentioned, the NIP is fine with predicates denoting taxonomic subkinds. A clear example is given in (10):

(10) ***Elger*** *kommer i flere underarter, blant annet alces alces alces, alces alces americanus og alces alces andersoni.* (gle)
Elks come in several sub-species, among other alces alces etc.

More surprising maybe, is the fact that they also go well with predicates like *be rare* or *common* as in (11), since the ability of functioning as subjects of such quantificational properties often has been taken as proof of kind-reference.

(11) *Her er* ***hunder*** *veldig vanlige og* ***ulver*** *er sjeldne.* (gle)
Here dogs are very common and wolves are rare.

Other predicates that sometimes have been taken as evidence of kind-reference, but are ok with bare NIPs include Norwegian translations of *originate from* and *be protected (by law).*

(12) ***Poteter*** *kommer opprinnelig fra Peru*. (gle)
Potatoes originate from Peru.

(13) ***Fugler****, herunder deres reir og egg, er fredet mot enhver form for skade, ødeleggelse osv*. (gle)
Birds, including their nests and eggs, are protected against any kind of dammage.

A clear distinction is thus made between subjects of predicates that are true of a kind as a whole, but not of its individuals (kinds), and the subjects of predicates that (also) apply to each individual one by one (generics) – the latter, but not the former, may be referred to by a bare NIP. Individual potatoes all originate from Peru – just like individual birds are protected by law – but they were not all introduced to Norwegians in the 17th century.

A last fact, regarding the modification of NIPs, deserves our attention before closing this section. Consider (14):

(14) a. ****Tigere*** *står på randen av utryddelse.*
Tigers are on the verge of extinction.
b. ***Hvite tigere*** *står på randen av utryddelse.*
White tigers are on the verge of extinction.

While the combination of a bare NIP with a true kind-predicate is ungrammatical, a

similar construction where the NIP is modified by an adjective is fine.

3.2.3 Meaning of NIPs

The interpretational properties of the NIP follows naturally, if the NIP marks number just like English, but diverge in that it also is inherently marked as indefinite. With a definition of definiteness based on speaker intentions, indefinites are incompatible with maximality, uniqueness and familiarity and thus with kind-reference. The distributive generic reading is still available, since it does not rely on the kind viewed as a whole. Also, if *tigere* alone refers to an indefinite plurality, the combination with the modifying adjective restricts the referent to a now specific sub-group of these first indefinite tigers. For this reason, (14b) is acceptable.

The idea that the NIP is indefinite, and not just neutral with regard to definiteness is in no way new – in fact indefinite plural is the label used for this sign in the Norwegian reference grammar (Faarlund et al., 1997). The theoretical and interpretational implications of this, and the contrast it gives with English, are nevertheless to my knowledge hitherto undescribed. Also, current works on Norwegian noun phrases tend to neglect or reject the idea that there is anything more indefinite to the Norwegian than to the English N: "(…) it seems clear to me that (…) the noun is indefinite only in the sense that there is no definiteness marker morphologically attached to it" (Julien, 2005: 36). I therefore provide some further support for the idea that the NIP is inherently indefinite.

Firstly, in contrast to the English bare plural, the NIP cannot function as a title accompanying proper names.

(15) *Forslag fra* ***stortingsrepresentantene/*stortingsrepresentanter*** *Laila Dåvøy, Åse Gunhild Woie Duesund og Ola Lånke.* (Dagbladet, 16/08-06)
Proposal from parlament-member-PL, DEF/*PL, INDEF Laila Dåvøy, Åse Gunhild Woie Duesund og Ola Lånke.

Secondly, when a Norwegian definite noun combines with a modyfing adjective, the combination is, normally, preceded by a demonstrative, and definiteness is thus marked twice. No preposed determiner is required with indefinites. Constructions like (16d) are often termed *double definiteness constructions*.

(16) a. *Store elger*
big-PL elk-INDEF, PL → big elks
b. *#Store elgene*
big-PL elk-DEF, PL
c. *#De store elger*
the big-PL elk-INDEF, PL

d. *De store elgene*
the big-e elk DEF, PL → the big elks

Similarly, strong determiners (generally) combine with definite plural nouns, weak ones only with indefinites:

(17) a. *Disse/de (store) elgene*
these/the big PL elk DEF, PL
These/those/the (big) elks
b. #*Disse/de (store) elger*
these/the big PL elkINDEF, PL
c. *Noen (store) elger*
some big PL elkINDEF, PL
Some (big) elks
d . **Noen (store) elgene*
some big PL elk DEF, PL

Thirdly, support is provided from variation in the mainland Scandinavian languages. While Danish, Norwegian and Swedish all have three noun suffixes, Danish stands out in disallowing the double definitness requirement which is compulsory in Norwegian and Swedish. Availability of kind reading from the Danish bare noun, supports the idea that indefiniteness is what disallows the same in Swedish and Norwegian.

(18) a. ***Elge** er truet av udryddelse.* (Danish)
b. #***Elger** er truet av utryddelse.* (Norwegian)
Elks are threatened by extinction.

It seems fair to conclude that the NIP is in fact inherently indefinite, and thus different from its English and Danish counterparts which are neutral with regard to definiteness. The difference has few consequences in every day language – we don't often (enough) speak of endangered species – but is important enough to help clarify a 30-year old discussion.

3.3 Norwegian bare nouns (traditionally indefinite singulars)

The most thorough presentation of the NBN is Kaja Borthen's *Norwegian Bare Singulars* (2003). Borthen says NBNs typically emphasize type rather than token, and delimits her object of investigation with the following: "A bare singular is a nominal constituent that is countable, singular, and indefinite, and that doesn't have a phonetically realized determiner" (Borthen, 2003: 10). The following presentation will focus just as much on those occurences that fall outside of her scope.

3.3.1 Distribution and interpretation of bare (non-plural) nouns – Norwegian compared and contrasted with English and French

Like the French bare noun, the bare NBN may function as a nominal predicate expressing a categorization of the subject into the class/kind that makes up the extension of the noun. Such constructions are, as seen below (see also Halmøy 2001) not limited to a certain class of words, only by contextual restrictions.

(19) a. *Jeg er **lingvist**.*
I am linguist.
b. *Dersom man er **elg** og blir kjørt på av et tog, blir man som oftest drept.* (gle)
If you are elk and get hit by a train, you normally get killed.
c. *Det (…) gamle postbygget midt i Bergen sentrum blir **kjøpesenter**.* (gle)
The old post building in Bergen becomes mall.

In both Norwegian and French, the classifying reading of bare predicative nouns is opposed to that of referential nominal predicates introduced by articles or other referential items. The latter are ambigous between an identifying and a characterizing reading.

(20) a. *Han er **slakter.*** (classifying)
b. *Han/det er en **slakter**.* (identifying/characterizing)
He is butcher/a butcher

In English, nominal predicates introduced by the indefinte article are ambigous between the classifying, identifying and characterizing reading.

(21) He is a butcher. (3 ways ambiguous)

Both in Norwegian and English, bare argumental (count) nouns may be interpreted as mass (22ab). Unlike English, Norwegian nevertheless use the singular definite for mass-kinds (c).

(22) a. *Vi har **elg** i fryseren.* (gle)
We have elk in the freezer.
b. *Vi skal ha **elg** til middag (…)* . (gle)
We're having elk for dinner.
c. *siden før mennesket oppfant **stålet.*** (gle)
since before man invented the steel.

Quite idiosyncratically in this company, the NBN often receives the 'type reading' illustrated below, where focus is on the type, not on the occurences.

(23) a. *Det er første gang at ei dame har skutt **elg** for Halvøya jaktlag.* (gle)
That is the first time that a woman has shot elk for Halvøya hunting-team.
b. *Og så er jeg flink til å tegne **elg**, smiler 10-åringen.* (gle)
I'm also good at drawing elks, smiles the ten year old.
c. *Enten ser man **elg**, eller så får man pengene tilbake.* (elvl 77)
Either you see elk or you get your money back.

And, as already mentioned, both weak indefinite, generic and true kind readings are available.

(24) a. *Vi så **elg** i skogen.* (gle)
We saw elk in the forest
b. *Det er **elg** i skogen.*
There is elk in the forest

(25) a. ***Elg** har fire bein.*
Elk has four legs.
b. ***Elg** er pattedyr.*
Elk is mammal.

(26) a. ***Elg** er ikke utrydningstruet i Norge.* (gle)
Elk is not threatened by extinction in Norway.
b. ***Banan** ble først importert til Norge i 1905.* (gle)
Bananas were first imported to Norway in 1905.

The equivalents of (23)-(26) are, of course, unavailable in both English and French The distributional and interpretational properties of the NBN do, thus, not only out-rank the bare English and French nouns, but also the NIP. In fact it exceeds the three of them taken together.

3.3.2 Meaning of NBNs – numberable

To account for all this, I propose that the NBN do not obligatory carry neither a number nor a definiteness value but may receive one from context, either intra- or extralinguistic. The data in (27)-(30) clearly indicate that both singularity and indefiniteness are unfit for describing the NBN. Prior indications that indefiniteness is non-inherent in the NBN was given by the fact that it, contrarily to the NIP, may combine with a true kind predicate. Also the second function distinguishing the NIP from the English plural, that of titles accompanying proper names, is, as seen in (27) available to the NBN.

(27) ***Kosmetikkdronning*** *Celina Middelfart,* ***nyhetsanker*** *Christian Borch,* ***skuespiller*** *Aksel Henie,* ***biskop*** *Ole Christian Kvarme (...) er på lista over kjendiser i nabokonflikter.* (Dagbladet 16/8-06)
Cosmetics queen Celina Middelfart, news anchor Christian Borch, actor Aksel Henie, bishop Ole Christian Kvarme (…) are on the list of celebrities in neighbour conflicts.

Another examples indicating lack of indefiniteness in the NBN is given in (28):

(28) *Nanna er så liten av vekst at han, når han skal kysse henne, på* ***panne*** *eller* ***munn****, må bøye seg kraftig.* (hubbo 334)
Nanna is so small that he, when he wants to kiss her, on forehead or mouth, must bend down heavily.

Even clearer exemples indicate that singularity wrongly has been taken as part of the grammatical meaning of the NBN:

(29) a. *Det finnes* ***elg*** *i Europa, Asia og Nordamerika.* (gle)
There are elks in Europe, Asia and North-America
b. *Jeg har sett* ***elg*** *tusenvis av ganger, og jeg har tatt noe sånt som 20.000 elgbilder.* (gle)
I have seen elks thousands of times, and I've taken around 20.000 elk pictures.

The NBN may even, as seen below, be used as an antecedent of a plural pronoun:

(30) *Er det* ***elg*** *her ute i skogen, så garanterer Maj Britt at Gregus finner* ***dem****.* (elvl 78)
If there is elk in the forest, Maj Britt guarantees that Gregus will find **them**.

Because of its capacity to both receive the non-referential reading required for a nominal predicate and all the referential readings found with English bare nouns, the NBN would – in order to preserve Bouchard's analysis of French and English – have to be able both to receive and to avoid number interpretations at will – i.e. depending on context – which is exactly what I propose. This understanding of the NBN is both inspired by and corroborated by Corbett's (2000) notion of General Number. In languages with General Number, number is, according to Corbett, expressed only when it matters; otherwise the general form is used. This is exactly what we find in Norwegian; when number and/or (in)definiteness values are important or relevant, the bare noun combines with one of its suffixes or with the indefinite article. When on the other hand these values are irrelevant or unambiguously given by context the general form may be used.

3.3.3 NBNs and agreement

The interpretation of the number (or definiteness) value of the NBN is highly context sensitive. This has consequences for the interpretational range of NBNs in agreement environments. Many neuter nouns never combine with an indefinite plural suffix, and are thus always ambiguous between a singular and a plural interpretation – even if the context might be very suggestive:

(31) a. *Flyktingehjelpen bygger **hus** i Sør-Libanon.* (gle)
The refugee-help builds houseN in South-Libanon.
b. *Her har jeg bygd meg **hus**, og her bor jeg med min lille chihuahua*. (gle)
Here, I have built myself house, and here I live with my little chihuahua.

Norwegian adjectives are nevertheless always singular (indefinite) or not, and the ambiguity from (31) thus disappears once *hus* is modified.

(32) a. *Vi har nettopp bygd **stort hus**, men allikevel …*(gle)
We have just built big-N, SG house, but still…
'We've just built a big house…'
b. *De bygger **store hus** og anskaffer store inntekter…*(gle)
they build big-PL house and acquire big incomes.
'They build big houses and acquire large incomes.'

Normally, only adjectives combining with a suffixed n-form take the e- suffix. NBNs that *do* combine with an indefinite plural-affix, can not combine with an -e suffixed adjective.

(33) a. *Vi har **hest**.*
'We have one or several horses'
b. *Vi har **brun hest/*brune hest**.*
we have brown horse M/brown-e horse M
'We have a brown horse'
c. *Vi har **brune hester/*brun hester.***
we have brown-e horse-INDEF, PL/brown horse-INDEF, PL
'We have brown horses'

The data in (33) strongly suggest that it is the bare adjective, not the bare noun, that carries the features singular, indefinite.

Interestingly, also the agreement properties of the NBN have relevance for the discussion on kind-reference and genericity. In combination with a singular (indefinite) adjective, the NBN may no longer combine with a true kind predicate.

(34) a. ***Tiger*** *står på randen av utryddelse.*
b. *****Hvit tiger*** *står på randen av utryddelse.*
Tiger/White tiger stand on the verge of extinction.

This indicates that the NBNs ability of being the subject of both kind and generic predicates relies on its capacity of receiving plural (non-indefinite) interpretations, and further that this ability would be lost had Norwegian still required subject verb agreement.

Further support for this analysis of the NBN as being marked for general number is given by Albanian, which like Norwegian marks both number and definiteness on the noun. The Albanian bare noun may like the NBN function bare as a predicate, and receive both mass and type readings in argument positions (Halmøy and Vocaj, 2006, Vocaj in prep). Even if it may receive plural interpretations as weak indefinites in object position, subject verb agreement requirements in Albanian blocks – as expected – the bare noun from being the subject of both kind and generic pedicates. See Halmøy (forthcoming) for data and discussion.

4 Conclusion

The present account of the NIP as being truly indefinite, and of the NBN as bearing general number and being neutral with regard to definiteness rather than encoding singular indefiniteness, satisfactorily describes the otherwise so intriguing properties of both these two signs in a unified way, thereby supporting not only Bouchard's (2002) analysis of number in French and English, but also the whole idea of saussurean arbitrariness requiring a strict one-to-one relationship between form and meaning. A language making a grammatical distinction between kinds and generics like the one displayed by the Norwegian indefinite plural, has never been properly described. A scrutiny of the Norwegian data reveals that true kind-predicates are even rarer than previously assumed. Even if the Norwegian data indicate that generics not necessarily are derived from kinds, the present proposal still confirms the main findings of the carlsonian approach (Carlson 1977, Chierchia 1998), like the affinity between kind-reference and definiteness, and the unified understanding of the English bare plural.

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Not only 'only', but 'too', too: Alternative-sensitive Particles in Bura*

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Abstract

This article discusses the syntactic and semantic behaviour of *alternative-sensitive particles* in Bura (Central-Chadic, Afro-Asiatic), a tone language spoken by about 250.000 speakers in Northeastern Nigeria. The observed findings help to evaluate a number of claims on the syntactic and semantic nature of alternative-sensitive particles, which have been made largely on the basis of European languages.

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1 Alternative-sensitive particles in European languages

We define *alternative-sensitive particles (AS-particles)* as functional elements whose interpretation depends on the alternatives introduced by foci or (contrastive) topics. The cross-linguistic inventory of alternative-sensitive elements includes the exclusive particles *only* (Engl.), *nur* (Germ.) (1a), the additive particles *also/too/either*, *auch* (1b) and the scalar particles *even*, *sogar* (1c) (König 1991). *Only* universally quantifies over alternatives, *also* and *even* existentially quantify over alternatives. In addition, *even* presupposes a scalar ordering of the alternatives (Karttunen & Peters 1979).

(1) a. Peter ate *only* guacamole.
For all x, if Peter ate x, x is guacamole

b. Peter ate *also* guacamole.
assertion: Peter ate guacamole
presupposition: Peter ate something else in addition

c. Peter ate *even* guacamole.
Assertion: Peter ate guacamole
presupposition 1: Peter ate something else in addition
presupposition 2: The fact that Peter ate guacamole is relatively unlikely compared to his eating of alternative dishes.

AS-particles associate with the focus or the (contrastive) topic (Krifka 1999) of the sentence. The focus-sensitive particles are constrained by the following structural restrictions: First, focus-sensitive elements must c-command the focus in English and German (Jacobs 1983, Bayer 1990, Büring & Hartmann 2001, Reis 2005):

(2) a. Peter showed *only* PICTURES$_F$ to John.
b. *PETER$_F$ showed only pictures to John.
intended: Peter is the only one who showed pictures to John

Second, the focus-sensitive elements in English (3a) (except for *too* and *either*) and German (3b) typically precede the focus:

(3) a. ?*Peter showed PICTURES only to John.
b. *Peter zeigte Hans BILDER nur.

There are two theories concerning the adjunction site of the focus-sensitive particles *only* and *nur*. Rooth (1985), Bayer (1990), and Reis (2005) assume that focus-sensitive elements are semantically flexible and can adjoin to nominal arguments (DPs) and (extended) verbal projections (VP, CP) alike. Jacobs (1983) and Büring & Hartmann (2001), in contrast, argue that focus-sensitive elements never adjoin to arguments (CP,

DP), but only to non-arguments: extended VPs, APs, root and adjunct CPs.[1] Third, the focus-particle must be placed as close as possible to the focus constituent (Büring & Hartmann 2001: 237). Typically, focus-particle and focus constituent are adjacent.

(4) a. Gestern hat Rufus *nur* dem MÄDCHEN$_F$ Blumen geschenkt.
yesterday has Rufus only the girl flowers given
'The only person that Rufus gave flowers to was the girl.'
b. *Gestern hat *nur* **Rufus** dem MÄDCHEN$_F$ Blumen geschenkt.

Fourth, English *only* must associate with a focus constituent that is formally marked, and hence identifiable, as focus constituent even in second occurrence focus contexts (SOF). In the final clause in (5), association with focus is evidenced by a slight but measurable prosodic prominence on the SOF *Bobby* (e.g. Beaver et al. 2007).

(5) You know what? You only introduced Mona to BOBBY$_F$ yesterday.
You also only introduced ASHLEY$_F$ to BOBBY$_{SOF}$ yesterday.

Fifth, focus sensitive particles associate into syntactic islands, such as relative clauses (Drubig 1994, Krifka 2006). The varying interpretation of (6ab) depends on the different placement of the focus within the relative clause.

(6) a. John only liked [the man that introduced BILL$_F$ to Sue]$_{FP}$.
b. John only liked [the man that introduced Bill to SUE$_F$]$_{FP}$.

To summarize, focus-sensitive elements such as *only* are *focus-functional*: they make direct reference to the focus-background structure of a clause in their lexical specification and are subject to *formal licensing conditions* (Beaver & Clark 2003).

Section 2 gives some grammatical information on Bura and discusses the inventory and the syntactic distribution of the AS-particles in this language. Section 3 presents a syntactic and semantic analysis of the exclusive particle *daci* ('only'). Section 4 analyses particle combinations in Bura and section 5 some differences between them.

[1]Languages seem to exhibit cross-linguistic variation concerning particle placement. While English is relatively flexible with respect to particle placement, particles in German (v. Stechow 1991) and Tangale (Chadic, Hartmann & Zimmermann 2007) always adoin to the same category, i.e. VP (and extended projections) in German, and DP in Tangale, respectively.

2 Alternative-sensitive particles in Bura

2.1 Syntactic structure of Bura

The basic word order of Bura is SVO. Bura has no overt case or tense morphology, but shows aspectual marking, cf. (7). It is worth pointing out that the functional projections DP and NegP in (8a), and CP with the final question particle Q in (8b) are right-headed structures. Adjectival modifiers also occur to the right (8c).

(7) Kubili ∅ / akwa / ata / ana tsi mtika.
K. PERF / PROG / FUT / HAB slaughter chicken
'Kubili slaughtered/ is slaughtering/ will slaughter/ slaughters a chicken.'

(8) a. Kubili [adi tsi [mtika **ni**]] **wa**
K. PRT slaughter chicken DEF NEG
'Kubili didn't slaughter the chicken.'

b. [Wa an likita ni] **ri**?
who PRT doctor DEF Q
'Who is the doctor?'

c. taku (na) wala
horse LINK big
'a big horse'

2.2 Focus marking

Bura shows a subject/non-subject asymmetry with respect to focus marking: Focused subjects must always be focus-marked by the focus particle *an* (in T), cf. (9). Focused non-subjects can occur unmarked in their base position (10-A1). Alternatively they can occur in sentence initial position in a syntactic cleft (10-A2), cf. Hartmann, Jacob & Zimmermann (2008).

(9) Q: Wa **an** tira ri?
who PRT leave Q
'Who left?'

A: **Ladi** *(an) tira.
L. PRT leave
'LADI left.'

(10) Q: **Mi** an ti Magira akwa ta ni ri? / Magira akwa ta **mi** ri?
what PRT REL M. PROG prepare DEF Q
'What is Magira preparing?'

A1: Magira akwa ta **diva mhyi**.
M. PROG prepare mush sorghum
'Magira is preparing SORGHUM MUSH.'

A2: **Diva mhyi** an ti tsa akwa ta.
'It is SORGHUM MUSH that she is preparing.'

Such subject/non-subject asymmetries in focus marking are wide-spread among the West African languages. Presumably, the obligatory marking of subjects owes to the fact that canonical (i.e. unmarked) subjects will receive a default interpretation as topics, unless they are marked for focus (Fiedler et al. 2007).

2.3 Inventory of alternative-sensitive particles

Bura exhibits three kinds of alternative-sensitive particles: the exclusive particles *daci, shini* 'only' (11ab), the additive particles *ma*, *tsuwa* 'also/too' (11cd), and the scalar particle *wala* 'even' (11e). In the examples, the particles all associate with the subject.

(11) a. *Mtaku* **daci** an liha Biu.
M. only PRT go Biu
'Only MTAKU went to Biu.'

b. *Ashina* **shini** an ti tsa masa tsir.
today alone PRT REL 3SG buy beans
'Only TODAY she bought beans.

c. *Ladi* **ma** thlika whada ni.
L. too plant peanut DEF
'LADI, too, plants peanuts.'

d. (ka) *Ladi* **tsuwa** tsa lukwa kwasuku.
and L. also 3SG went market
(Magira went to the market …) 'and LADI, too, went to the market.'

e. **Wala** *Kubili* **ma** tsa si.
even K. too 3SG come
'Even KUBILI appeared.'

The co-occurrence of *wala* with additive *ma* in (11e) suggests that the only meaning component of *wala* is scalarity, unlike English *even* and German *sogar*, which combine additivity and scalarity in their meaning (König 1991). In what follows, we will mainly concentrate on the particles *daci* 'only' and *ma/tsuwa* 'also, too'.

2.4 Syntactic distribution of alternative-sensitive particles

This section presents three generalizations about the syntactic distribution of AS-particles in Bura. First, with the exception of *wala* 'even', AS-particles follow the constituent they associate with. This is similar to English *too,* but unlike other focus particles in German and English (Büring & Hartmann 2001). (12a)/(13a) illustrate association with a subject, (12b)/(13b)/(14) show association with an object.

(12) a. *Mtaku* **daci** an liha Biu.
M. only PRT go Biu
'Only MTAKU went to Biu.'

b. Tsa masta *kwara* **daci**.
3SG buy donkey only
'She bought only A DONKEY.'

(13) a. *Ladi* **ma** thlika whada ni.
L. too plant peanut DEF
'LADI, too, plants peanuts.'

b. Tsa ana thlika *puwa* **ma**.
3SG HAB plant cotton too
'He is planting COTTON, too.'

(14) Magira masta *tsir* **tsuwa** naha.
M. buy bean also yesterday
'(M. bought meat, mangoes, and …) M. also bought BEANS yesterday.'

Second, while the particles *daci* 'only' and *ma* 'also/too' stand adjacent to the constituent they associate with in (11) to (14), they may also occur at a distance. In (15), the sentence-final particles associate with the subject in its canonical position.

(15) a. *Mtaku* an liha Biu **daci**.
M. FM go Biu only
'Only MTAKU went to Biu.'

b. *Ladi* thlika whada **ma**.
L. plant peanut too
'LADI, too, plants peanuts.'

Note that the exclusive particle *shini* 'alone' cannot associate at a distance. It must adjoin to DP.

(16) Mwala ni masta *yarnfwa* (**shini**) aka bzir ni (***shini**).
woman DEF buy oranges only for child DEF only
'The woman bought only ORANGES for her child.'

Finally, it can be shown that *daci* really associates with a focus constituent. If the focus marker *an* in (15a) is dropped, as in (17), association at a distance is no longer possible. Instead, final *daci* must associate with the constituent immediately to its left:

(17) Mtaku liha *Biu* **daci**.
M. go Biu only
'Mtaku went only to BIU.' NOT: 'Only Mtaku went to Biu.'

In short, association of exclusive *daci* 'only' with the subject requires focus-marking by *an*, both under adjacency (12a) and at a distance (15a). This shows that *daci* is focus-sensitive. Section 5 will show that the association of additive *ma* 'also/too' with subjects is different in that it does not allow for focus marking on the subject, cf. also (11cd), (13a), and (15b).

3 The Analysis of *daci* 'only'

3.1 Assumptions

As argued in the preceding section, *daci* is focus-functional in the sense of Beaver & Clark (2003), i.e. its focus associate must be clearly identifiable. Focus identification can be achieved in two ways. First, the focus associate can be focus-marked by the particle *an*, which is obligatory with focused subjects, as shown once more in (18ab):

(18) a. *Mtaku* **daci** *(an) liha Biu.
M. only PRT go B.
'Only MTAKU went to Biu.'

b. *Mtaku* *(an) liha Biu **daci**.
M. PRT go B. only
'Only MTAKU went to Biu.'

Second, focused non-subjects, which do not require formal focus marking (section 2.2), are typically adjacent to *daci*, cf. (19).

(19) a. Magira *si* **daci**.
M. came only
'Magira only CAME.'

b. Magira si *naha* **daci**.
M. came yesterday only
'Magira came only YESTERDAY.'

c. Magira si naha *ahar Kano* **daci**.
M. came yesterday from Kano only
'Magira came only FROM KANO yesterday.'

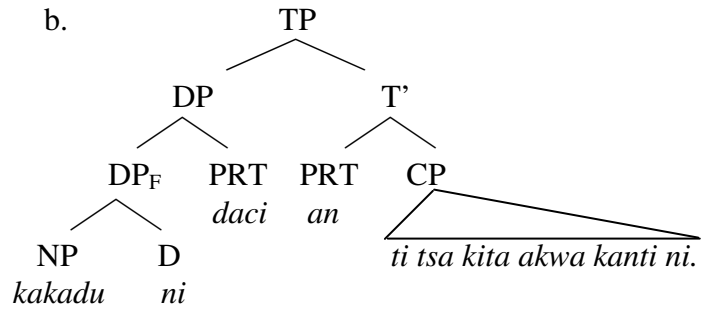
As for linear order, we assume that the particle *daci* follows the focus constituent because the sentential domain (TP, CP) and the DP-domain are left-branching in Bura, cf. section 2.1.

Finally, observe that the semantic type of *daci* must be flexible (Rooth 1985) since it combines with DPs (18a), sentences (18b), and possibly even with V/VP, cf. (19a). The combination of *daci* with DP and TP is analysed in 3.2 and 3.3, respectively.

3.2 Association with DP

In (20ab), the focus-sensitive particle *daci* right-adjoins to the DP it associates with.

(20) a. [$_{DP}$ [$_{DP}$ *Kakadu* *ni*] **daci**] an ti tsa kita akwa kanti ni.
book DEF only PRT REL 3SG take at shop DEF
'It is only THE BOOK that he took from the shop.'



We assume that adnominal *daci* on DP is a quantifier with the meaning in (21). *Daci$_{DP}$* is a binary functor that takes the meaning of a focused DP and a backgrounded predicate as its two arguments, cf. (22a). The semantic derivation of (20) is shown in (22b-e).

(21) $[\![\text{daci}_{DP}]\!] = \lambda x.\lambda Q.\forall z \in [\![x]\!]^f : Q(z) \rightarrow z = x$

(22) a. [[daci]]([[kakadu ni]]) ([[ti tsa kitaakwa kanti ni]])

b. $\Leftrightarrow$ [$\lambda x.\lambda Q.\forall z \in [\![x]\!]^f$: Q(z) $\rightarrow$ z = x](ιx. book'(x))(λx. he took x from the shop)

c. $\Leftrightarrow$ [$\lambda Q.\forall z \in [\![\iota x.$ book'(x)$]\!]^f$: Q(z) $\rightarrow$ z = ιx. book'(x)](λx. he took x from the shop)

d. $\Leftrightarrow \forall z \in [\![\iota x.$ book'(x)$]\!]^f$: he took z from the shop $\rightarrow$ z = ιx. book'(x)]

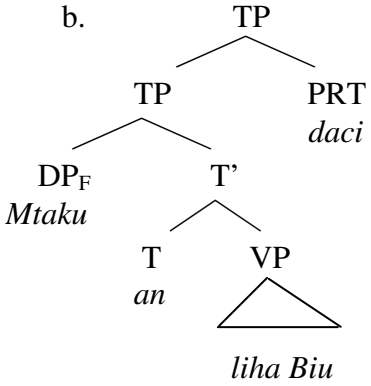
e. = 1 iff the unique thing that he took from the shop is the book

3.3 Association with TP

As pointed out in section 2.4, the focus-sensitive particle *daci* can also associate with a distant subject focus from the clause-final position. In this case we assume the particle to be right-adjoined to the root TP, as shown in (23ab) (=15a).

(23) a. [$_{TP}$ [$_{TP}$ *Mtaku* an liha Biu] **daci]**
M. PRT go B. only
'Only MTAKU went to Biu.'

b.



Semantically, sentential *daci$_{TP}$* associates with the set of alternative propositions that is induced by focus-marking on the subject via the mechanism of focus projection (Rooth 1985). *Daci$_{TP}$* is an adverbial quantifier with the meaning in (24). The semantic derivation of (23) is shown in (25).

(24) $[\![\text{daci}_{TP}]\!] = \lambda w.\lambda q.\forall p \in [\![q]\!]^f : p(w) \rightarrow p = q$

(25) a. $[\![\text{daci}]\!](w)\ ([\![\text{Mtaku}_F \text{ an liha Biu}]\!])$

b. $\Leftrightarrow [\lambda w.\lambda q.\forall p \in [\![q]\!]^f : p(w) \rightarrow p = q]\ (w)\ (\lambda w.\ \text{Mtaku}_F \text{ went to Biu in w})$

c. $\Leftrightarrow \forall p \in [\![\lambda w.\text{Mtaku}_F \text{ went to B. in w}]\!]^f: p(w) \rightarrow p = \lambda w.$ Mtaku went to B. in w

d. $\Leftrightarrow \forall p \in \{\lambda w.$ x went to Biu in w $\mid x \in \{$Mtaku, Kubili, Magira, Pindar,…$\}\}$: $p(w) \rightarrow p = \lambda w.$ Mtaku went to Biu in w

e. = 1 iff the unique true proposition in w of the form 'x went to Biu' is the proposition 'Mtaku went to Biu'.

3.4 Additional evidence

The proposed analysis of focus association at a distance is supported by two independent arguments. First, the assumption of a high structural position for *daci$_{TP}$* in (23) is confirmed by the behaviour of the negation marker *wa*. This element can also take scope over a focus-marked subject from sentence-final position, when the subject is preceded by *adi*, an element that marks the scope of negation (Zimmermann 2007):

(26)	[adi	*Kubili*	an	[$_{VP}$	simamya	mtika	ni]]	**wa**.
	PRT	K.	PRT		eat	chicken	DEF	NEG

'It is not KUBILI that ate the chicken.'
NOT: 'It is KUBILI that did not eat the chicken.'

Second, the assumption of focus association at a distance that is semantically mediated through the projection of focus alternatives also accounts for the possibility of association with *daci* into focus islands (Drubig 1994, Krifka 2006). In (27), *daci* quantifies over things that the speaker wants, but the alternatives in the restriction depend on the location of focus inside the relative clause, as shown in (28).

(27) *Context*: Various people gave something to Kubili, but …
Iya bara [$_{DP}$ [$_{NP}$ su [$_{CP}$ ti *Magira* an naa aka Kubili]] ni] **daci**
1SG want thing REL M. PRT give to K. DEF only
'I want only the thing that MAGIRA gave to Kubili.'

(28) ∀z∈ {ιx. y gave x to Kubili | y∈ {Mtaku, Kubili, Magira, Pindar,…}}:
Speaker wants z → z = ιx. Magira gave x to Kubili
= 1 iff
the unique thing that the speaker wants is the thing that Magira gives to K.

3.5 The structure of association with non-subject focus

Having looked at the association of *daci* with focused subjects, we now proceed to the analysis of sentences such as (29) (=12b), where *daci* occurs adjacent to an object.

(29) Tsamasta *kwara* **daci**.
3SG buy donkey only
'She bought only a DONKEY.'

In principle, there are two possibilities for the placement of *daci* in (29). The particle is either locally right-adjoined to DP, cf. (30a), or it adjoins again to TP, cf. (30b). Both possibilities are attested for association of *daci* with subjects, see above.

(30) a. [$_{TP}$ Tsa masta [$_{DP}$ [$_{DP}$ *kwara*] **daci**]] → *local adjunction to DP*
b. [$_{TP}$ [$_{TP}$ Tsa masta *kwara*] **daci**] → *adjunction to TP*

Notice that (30ab) have equivalent interpretations. (30'a) shows the meaning for the structure with adnominal *daci*, and (30'b) for the structure with adverbial *daci*.

(30') a. $\forall P \in [\![\lambda x.\text{donkey}'(x)]\!]^f : \exists z\,[P(z) \wedge \text{he bought } z] \rightarrow P = \lambda x.\ \text{donkey}'(x)$

= 1 iff the unique relevant property such that he bought an individual with this property is the property of being a donkey

b. $\forall p \in \{\lambda w.\exists x[P(x) \wedge$ he bought x in w$|\ P \in \{\lambda x.$book'$(x), \lambda x.$ donkey'$(x),...\}]\}$:
$p(w) \rightarrow p = \lambda w.\ \exists x$ [donkey'$(x) \wedge$ he bought x in w]

= 1 iff the unique true proposition in w of the form 'There is an x such that P(x) and he bought x' is the proposition 'There is an x such that x is a donkey and he bought x'

Even though (30ab) have the same interpretation, there are two arguments in favour of local adjunction of the particle to the non-subject focus constituent, as in (30a). One argument is conceptual in nature, and the other one empirical. The conceptual argument has to do with the fact that the semantic component must be supplied with additional information to the effect that the focus constituent is the one immediately preceding *daci* in the absence of any formal marking on a non-subject focus, cf. (31ab). If *daci* directly adjoins to the focus constituent, however, its association with *naha* in (31a), and with *ahar Kano* in (31b), falls out directly.

(31) a. Magira si *naha* **daci**.
M. came yesterday only
'Magira came only YESTERDAY (on no other day)'

b. Magira si naha *ahar Kano* **daci**.
M. came yesterday from Kano only
'M. came only from *kano* yesterday.'
NOT: 'Magira came only YESTERDAY from Kano.

The empirical argument for the adnominal position of *daci* with non-subject foci has to do with the fact that the particle can also associate with such foci from non-final position, *but under adjacency*. This is shown in (32).

(32) Mtaku masta *taku* **daci** akwa kwasuku.
M. buy horse only at market
'Mtaku only bought A HORSE at the market.'

Thus, the assumption of local adjunction of *daci* with non-subject foci as in (30a) appears to be both conceptually simpler and empirically more adequate.

4 Particle combinations

In English, various AS-particles can co-occur in the same clause, giving rise to the phenomenon of multiple association with focus (or contrastive topic) (cf. Krifka 1992).

(33) a. Even$_1$/Also$_1$ JOHN$_{F1}$ only$_2$ drank WATER$_{F2}$.
b. John even$_1$ [only$_2$ [$_{VP}$ drank WATER$_{F2}$] $_{F1}$]

The co-occurrence of several AS-particles in one clause is also attested in Bura. Moreover, if the particles associate with distinct constituents, the resulting readings depend on the relative structural position of the particles in a compositional way. This is illustrated in (34ab), where the different relative order of the particles *daci* and *ma* brings about a difference in the association patterns:

(34) a. *Context 1:* Magira grows peanuts and rice, Kubili grows only peanuts, and...
[*Ladi*$_2$ ana thlika [*whada*$_1$ **daci**$_1$]] **ma**$_2$.
L. HAB plant peanut only too
LADI, **too**, grows **only** PEANUTS.'
ASS: Ladi grows only peanuts.
PRES: Somebody else grows only peanuts, i.e. Kubili. ***ma >> daci***

b. *Context 2:* Magira and Kubili only grew sorghum and nothing else...
[*Ladi*$_1$ an thlika *whada*$_2$ **ma**$_2$] **daci**$_1$.
L. PRT plant peanut too only
'It's **only** LADI that grew PEANUTS **as well** (in addition to sorghum)'
ASS: Only Ladi grew peanuts.
PRES: Ladi grew s.th. else in addition, i.e. sorghum ***daci >> ma***

Similar effects are observed with combinations of *daci* and the sentence-final negative marker *wa*. In (35), negation takes scope over the focus-sensitive particle, reflecting the relative structural position of the two elements.

(35) Pindar adi kitsa yimi **daci wa**, ama tsa hara kithliryeri damwa.
P. PRT fetch water only NEG but 3SG do things other
'Pindar **didn't only** fetch water, but she did other things (as well).'

A final interesting case of second occurrence focus is illustrated in (36). Here *daci* is right-adjoined to the clause and associates with the subject at a distance. What is surprising is that the additive particle *ma* appears to be right-adjoined to the subject, but seems to associate with a constituent *to the right*, i.e. with the object.[2]

(36) *Context*: Magira, Kubili and Ladi grew sorghum. Ladi and Magira grew beans. Only Ladi grew cotton.

[2]We must leave it open what factors condition association to the right in (36). Possibly, the alternative configuration in (i) is blocked because the association paths of the two particles cross.

(i) [*Ladi*$_1$ an thlika *whada*$_2$ **daci**$_1$] **ma**$_2$

Interestingly, in the German equivalent to (35), the additive particle *auch* must be stressed and associates with the contrastive topic ERDNÜSSE 'peanuts', as in (ii):

(ii) German: /ERDNÜSSE hat AUCH\ nur Ladi$_{SOF}$ gepflanzt.

Ladi$_{\mathbf{1/SOF}}$ **ma**$_{\mathbf{2}}$ an thlika *whada*$_{\mathbf{2}}$ **daci**$_{\mathbf{1}}$.
L. too PRT plant peanut only
'Also only LADI grew PEANUTS.'
ASS: Only Ladi grew peanuts.
PRES: Only Ladi grew something else.

5 Structural differences between *daci* and *ma/tsuwa*

In this section we investigate structural differences between the additive particles *ma/ tsuwa* and the exclusive particle *daci*, which suggest a different semantic status as topic-sensitive and focus-sensitive, respectively. Unlike the case with *daci*, a subject must not be marked by the focus particle *an*, if it functions as the associate of *ma* (and *tsuwa*). (37a) (= (11c)) shows this for association under adjacency, and (37b) (= (15b)) for association at a distance.

(37) a. *Ladi* **ma** thlika whada ni.
L. too plant peanut DEF
'LADI, too, grew peanuts.'

b. *Ladi* (*an) thlika whada **ma**.
L. PRT plant peanut too
'LADI, too, grew peanuts.'

That *ma* cannot associate with a focus-marked subject is also supported by the following observation. It shows that *ma* cannot associate with a subject that is grammatically marked by *an*. Instead, it must associate with the adjacent object in (38):

(38) Ladi an thlika *whada* **ma**.
L. PRT plant peanut too
'It is LADI that plants PEANUTS as well (in addition to other things).'

It follows from (37) and (38) that *ma* never associates with focus-marked subjects. Given that focus marking on subjects is obligatory in Bura, the subject associate of *ma* thus cannot be the focus of the utterance. Instead, we propose that the additive particles *ma* and *tsuwa* associate with a (contrastive) topic, as argued in Krifka (1999) for stressed additive *àuch* in German. Given that contrastive topics also induce alternatives (Büring 1997), we can treat *ma* as an AS-particle. The analysis is supported by the fact that *ma* can associate with canonical (unmarked) subjects, cf. (37ab), which make good topics cross-linguistically. Compare the association of *àuch/tòo* with unstressed *es*-subjects in German and English (Krifka 1999: ex.30a):

(39) *Es* ist wahrscheinlich **àuch** runtergefallen.
'It probably fell down, tòo.'

Furthermore, the two additive particles in Bura occur in environments that are typical of contrastive topics (Krifka 1999), for instance, in answers to multiple questions:

(40) Q: Who bought what?
A: *Kubili* (*an) masta mhyi, *Mtaku* (*an) masta kwara, ka …
Magira **tsuwa** masta mhyi.
M. also buy sorghum
(K. bought sorghum, Mt. bought a donkey, and...) 'MAGIRA also bought sorghum.'

Additive particles also appear in successive partial answers, thus licensing a violation of the *distinctiveness constraint* (cf. Krifka 1999). This is illustrated in (41) for English, and in (42) for Bura.

(41) Q: What did Peter and Pia eat?
A: Peter and Pia/ They ate pasta.
A': #Péter ate pàsta and Pía ate pàsta.
A'': Péter ate pàsta and Pía ate pàsta, too.

(42) a. *Context:* Magira grew peanuts, and Kubili grew peanuts, and …
ka *Ladi* **ma** thlika whada ni.
and L. too plant peanut DEF
'and LADI, too, grew peanuts.'
b. Ladi ana tsuha whada ka *(tsuwa) tsa ana thlika *puwa* **ma**.
L. HAB farm peanut and also 3SG HAB plant cotton too
'Ladi plants groundnuts and he plants COTTON as well.'

We thus conclude that the additive particles associate with a contrastive topic in Bura. A potential problem for this analysis comes from the fact that *ma* can also associate with clefted non-subjects. Recall from section 2.2 that ex situ non-subjects are always marked by the particle *an* (cf. Hartmann, Jacob & Zimmermann 2008).

(43) a. [Ala *mji* *wala-wala* **ma**] **an** ti tsa bwata.
for people old-old too PRT REL 3SG cook
'It is for the elders, too, that she cooked it (not only cook for the child).'
b. [Ala *mji wala-wala*] **an** ti tsa bwata **ma**.

However, it is well known from European languages that clefting does not necessarily indicate the focus status of the clefted constituent, but can also be used to highlight a (contrastive) topic (Delin 1989, Huber 2006). Extending this argument to Bura, the additive particle *ma* in (43ab) may still be taken to associate with a topic. Notice that this line of reasoning implies a reanalysis of the focus particle *an* as a marker of alternative-inducing elements. Given all this, then, the distribution and association behaviour of alternative-sensitive elements may well serve as a good diagnostic of the IS-properties of clefted constituents.

6 Conclusion

Despite the fact that Bura differs typologically from the Indo-Germanic languages of Europe, the behaviour of AS-particles is quite similar: They evaluate the meaning of a clause relative to a set of alternatives. Their association with focus and topic is subject to structural licensing conditions. They can combine with DPs and root clauses alike. And they interact with each other in a compositional way. Furthermore, like stressed *àuch* and *tòo*, additive particles in Bura appear to associate with contrastive topics, rather than with focus. All in all, the observed similarities make AS-particles good candidates for a functional class with universal traits.

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Decomposing Antonyms?*

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Abstract

Are the marked members of antonym-pairs such as *long – short* decomposed in the syntax? Büring has recently argued that they are, on the basis of evidence about the distribution of Rullmann-ambiguities and crosspolar anomalies. But the readings of marked antonyms in the complements of matrix modals seem to argue for the opposite conclusion. The dilemma that results defies a simple solution. Perhaps it tells us something about the workings of Comparative Deletion.

1 Introduction

This paper considers the question of whether the marked members of antonym pairs like *long – short* are decomposed in the syntax. Daniel Büring has recently updated and substantially expanded an argument first envisaged by Rullmann (1995), supporting the conclusion that the surface form *short* sometimes spells out a collocation of two abstract items **little** and **long** which do not form a semantic constituent (Büring 2007a, b). I will quickly review Büring's arguments and the analysis that he takes them to support. I then show that this analysis overgenerates unattested readings in a class of examples where *shorter* is systematically not equivalent to *less long*. These data were previously discussed in Heim (2006), where they led me to conclude that antonyms are not decomposed.

Pairs of antonyms such as *long – short*, *old – young*, *fast – slow* are characterized by the truth-conditional equivalence of (1a - c), where α^+ stands for the first member in one of these pairs (e.g., *long*, *old*, *fast*) and α^- for its second member (*short*, *young*, *slow*).

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(1) a. x is α^+er than y is.
b. y is α^-er than x is.
c. y is less α^+ than x is.

One way to capture these equivalences (and other patterns of reasoning with antonyms) involves interpreting α^+ and α^- as negations of each other, as in the following set of lexical entries.

(2) a. $[\![\textbf{long}]\!] = \lambda x.\ (0, L(x)]$
b. $[\![\textbf{short}]\!] = \lambda x.\ (L(x), \infty)$
c. $[\![\textbf{er}]\!] = \lambda A.\ \lambda B.\ B \supset A$
d. $[\![\textbf{less}]\!] = \lambda A.\ \lambda B.\ B \subset A$

("L" stands for the measure function length, and sets of degrees are given in interval notation.) In the syntactic structure at Logical Form (LF), the comparative morpheme **er** combines first with the *than*-complement (a possibly elliptical wh-clause) and then with the matrix-clause it has scope over. Both of these clauses denote sets of degrees, and the comparative is true iff the matrix-set is a proper superset of the *than*-clause set. Given that $[\![\alpha^-]\!]$ (e.g., $[\![\textbf{short}]\!]$) maps an individual to the complement of the set to which $[\![\alpha^+]\!]$ (e.g., $[\![\textbf{long}]\!]$) maps it, the equivalences between (1a) and (1b) and between (1b) and (1c) boil down to the set-theoretic fact that A is a proper subset of B iff the complement of B is a proper subset of the complement of A.

The entries in (2) exemplify what I call a "lexical negation theory of antonymy". In such a theory, the denotations of *long* and *short* are related by the operation of (predicate) negation, but there is no meaningful part of the syntactic representation of *short* that expresses this operation. I contrast this with a "syntactic negation theory of antonymy". This type of theory has no listing for a minimal meaningful item **short** in its lexicon; instead it always generates the surface form *short* by spelling out a collocation of two meaningful units, one of which is the same as what spells out *long* and the other is some kind of negation operator. The proposal in Büring (2007a, b) is an instance of such a theory. It posits an abstract item (called **little**) which expresses predicate negation and which figures in the pre-spell-out representations of both *short* and *less*. *shorter* and *less long* in fact are alternative spell-outs of the same underlying representations. I present Büring's analysis in section 2, review its motivation in section 3, and show that it overgenerates in section 4. In section 5, I introduce a modification of the proposal from Heim (2006) and suggest that it might account for the data under suitable assumptions about Comparative Deletion. This conclusion, however, will be very tentative, and the main purpose of the paper is to draw attention to a difficult dilemma.

2 A syntactic negation theory of antonymy

Büring's proposal can be summed up in the following lexical entries (3) and spell-out rules (4).[1]

(3) a. ⟦**long**⟧ = λx. (0, L(x)]
b. ⟦**er**⟧ = λf. λA. λB. f(B) ⊃ f(A)
c. ⟦**little**⟧ = λA. –A
d. ⟦**much**⟧ = λA. A

(4) a. **long** > *long*
b. **er** > *er*
c. **er little** > *less*
d. **little long** > *short*

A simple comparative not involving **little** is analyzed in (5). Here and henceforth, grey material feeds spell-out but not interpretation, struck-out words (and lambdas and indices) are interpreted but not spelled out, struck-out grey material is neither interpreted nor spelled out, and the rest is both interpreted and spelled out. The representations are generated by a copy-theory of movement, with rightward covert movement of DegP and late merger of the *than*-clause (cf. Bhatt & Pancheva 2004). DPs (*the rope*, *the wire*) are abbreviated by single letters and assumed to reconstruct for interpretation. For ease of reference, I use the labels "PF" and "LF" for the truncated versions of the syntactic representation which are missing respectively the material that doesn't affect spell-out and the material that isn't interpreted. (But strictly speaking, there is only one representation that is interpreted at both interfaces.)

(5) a. The rope is longer than the wire is.
b. [λ_1. r is [er ~~much~~]$_1$ ~~r~~ long] ~~er much~~ than ~~wh~~ [λ_2. w is ~~wh$_2$ w long~~]
c. PF: r is er long than w is
er long > *er long* (> *longer*)
d. LF: [λ_1. t_1 r long] [er much] [λ_2. t_2 w long]
⟦**long**⟧(r) ⊃ ⟦**long**⟧(w)

The second line (5b) shows the full syntactic representation with all copies of movement chains and all elided material. The third line (5c) ("PF") shows how to get to the surface form, by deleting from (5b) all struck-out material as well as all lambdas, indices and brackets, and then spelling out what is left. The fourth line (5d) ("LF") shows how to compute the meaning from (5b), by first deleting all the grey material and

[1]There are minor differences from Büring's own implementation. Throughout this paper, I generate the adjective's subject as its innermost argument. Basically, I just want to abstract away from the question of how exactly the adjective's arguments are introduced and ordered.

then plugging in denotations form the lexicon and using semantic composition rules and logical inferences as usual. Note that the combination of Büring's meaning for **er** with his **much** amounts to our previous simpler meaning for **er** in (2c). The reason why **much** is needed is to have a uniform semantic type for **er** which allows it to also combine directly with **little** (see below).[2]

Now let us turn to derivations with **little**. One syntactic representation we can generate is just like (5b) except with **little** replacing **much**. This is in (6a) and looks like (6b) to the spell-out rules and like (6c) to the semantics.

(6) a. [λ_1. r is [er little]$_1$ ~~r~~ long] ~~er little~~ than ~~wh~~ [λ_2. w is ~~wh$_2$ w long~~]
b. PF: r is er little long than w is
c. LF: [λ_1. t_1 r long] [er little] [λ_2. t_2 w long]

Since the meaning of the complex **er little** is that of **less** in (2d), (6c) says that ⟦**long**⟧(r) ⊂ ⟦**long**⟧(w), i.e., the rope is shorter than the wire, or equivalently, the rope is less long than the wire. But how is (6b) spelled out? Büring's proposal says that it can actually be spelled out in two different ways. We can either use the spell-out rules in (4b) and (4d), so **er** > *er* and **little long** > *short*, which gives us *er short* = *shorter*. Or we can use the rules in (4c) and (4a), so **er little** > *less* and **long** > *long*, which yields *less long*. (6a) and its meaning ⟦**long**⟧(r) ⊂ ⟦**long**⟧(w) are therefore paired with both the surface strings *the rope is shorter than the wire is* and *the rope is less long than the wire is*. In general, spell-out operates as a series of replacement operations that rewrite substrings of the original string. Each such operation must be sanctioned by a spell-out rule, and everything in the original string must eventually be rewritten. Other than that, the rules apply optionally and freely, and in particular, those rules like (4c, d), which amalgamate two input items into one output item, can (but need not) apply whenever a string contains these input items next to each other.

There is another syntactic representation that also spells out in the same two ways and also has the same semantic interpretation. Here **little** is generated not as the argument of **er** but adjoined to the adjective phrase.

(7) a. [λ_1. r is [er ~~much~~]$_1$ little ~~r~~ long]
~~er much~~ than ~~wh~~ [λ_2. w is ~~wh$_2$ little w long~~]
b. PF: r is er little long than w is
c. LF: [λ_1. t_1 little r long] [er much] [λ_2. t_2 little w long]

Since **little long** effectively means **short** as interpreted in (2b) and **er much** means **er** as in (2c), (7c) says again that ⟦**long**⟧(r) ⊂ ⟦**long**⟧(w). And (7b) is indistinguishable from

[2]This is how Büring overcomes the compositionality problem which plagued an earlier version of this analysis in Rullmann (1995). See Heim (2006).

(6b) to the spell-out component, so both pronunciations (*the rope is shorter than the wire is* and *the rope is less long than the wire is*) can be derived as before.

A key feature of this theory is that two hierarchically different arrangements of the items **er**, **little**, **long** in the syntax can end up with the same pronunciation. Of particular interest to us is the fact that the surface word *short* can spell out a **little** and **long** which never form a constituent with each other in (6a) and whose interpreted copies are quite far apart from each other in (6c). We have yet to see the motivation for this theory, but when we do so below, we particularly want to scrutinize the justification for this type of semantics-morphology mismatch.

3 Crosspolar anomalies and nomalies

Büring's analysis, as introduced above, can be seen as an updated and compositional version of a theory entertained by Rullmann (1995, attributed there to a suggestion by Barbara Partee). Part of the motivation that Büring gives for it (see Büring 2007a) also goes back to Rullmann and turns on the ambiguity of sentences like (8a, b).

(8) a. He is less tall than he is allowed to be.
b. He is shorter than he is allowed to be.

I will concentrate here on another argument, however, which was newly contributed by Büring (2007b) and in some ways is more straightforward, since it is based on simpler structures that don't involve ellipsis or modal operators. The backdrop for this argument is Kennedy's (2001) work on what he dubbed "crosspolar anomaly", the deviance of comparatives like (9b) compared to (9a, c).

(9) a. The rope is longer than the gap is wide.
b. *The rope is longer than the gap is narrow.
c. The rope is shorter than the gap is narrow.

Kennedy, working with a non-decompositional analysis of antonyms essentially like that in (2) above, proposes that the comparative operators **er** and **less** cannot relate two sets of degrees that are on opposite ends of a scale. I.e., they can compare two initial segments of the spatial distance scale[3], as in (9a), or two final segments as in (9c), but not an initial with a final segment as in (9b). Perhaps this is because such comparisons will be necessarily false, or because the comparative morphemes actually carry a presupposition that its two relata must be both initial or both final segments. We need not decide here on the exact nature of the constraint, just on this descriptive

[3]By the "spatial distance scale", I mean the shared ordered set of degrees into which the measure functions associated with **long**, **wide**, **high**, etc. map their arguments.

generalization. Büring accepts Kennedy's constraint, but points out that it is *prima facie* falsified by the missing fourth member of the paradigm in (9), namely (10).

(10) The rope is shorter than the gap is wide.

By Kennedy's constraint, (10) should be just as deviant as (9b), but it is actually grammatical. Why is that?

Büring's answer is that (10) is good because it spells out two distinct syntactic representations, only one of which violates the constraint. The bad derivation is (11) and the good one is (12) (compare (7) and (6) above).

(11) a. [λ_1. r is [er ~~much~~]$_1$ little ~~r~~ long] ~~er much~~ than ~~wh~~ [λ_2. g is ~~wh~~$_2$ ~~g~~ wide]
b. r is er little long than g is wide
c. [λ_1. t_1 little r long] [er much] [λ_2. t_2 g wide]

(12) a. [λ_1. r is [er little]$_1$ ~~r~~ long] ~~er little~~ than ~~wh~~ [λ_2. g is ~~wh~~$_2$ ~~g~~ wide]
b. r is er little long than g is wide
c. [λ_1. t_1 r long] [er little] [λ_2. t_2 g wide]

(11) violates Kennedy's constraint because there is an interpreted **little** in the matrix clause but none in the *than*-clause. As a result (seen in (11c)), the matrix clause denotes a final segment of the distance-scale and the *than*-clause an initial segment. (12), on the other hand, is just fine: neither the matrix nor the *than*-clause contain an interpreted **little** (see (12c)), and so we are comparing two initial segments. Both of the representations in (11) and (12) spell out either as (10) or as *The rope is less long than the gap is wide*. Indeed, both of these sentences are fine, as predicted by the fact that they both have at least one derivation that respects the semantic constraint. The crucial point of Büring's argument is that (10) could not be grammatical unless it allowed the derivation in (12). This in turn shows that **little long** must be able to surface as *short* even when **little** and **long** are not sisters in the syntactic structure and not composed with each other at LF.

4 When *shorter* cannot paraphrase *less long*

A general prediction of Büring's analysis is that *shorter* and *less long* can be substituted for each other in all environments without any change in meaning or in available readings. This must be qualified a bit. Büring (2007a) actually says that while both [**er little**] **long** and [**er much**] [**little long**] may surface as either *less long* or as *shorter*, there is a preference for the former to surface as *less long* and the latter to surface as *shorter*. In other words, the spell-out rules in (4c) and (4d) can ignore the syntactic bracketing, but this is a somewhat marked option, and the preferred or unmarked way to

spell these structures out is to amalgamate only syntactic sisters. To implement this preference formally, we would presumably have to move away from the simplistic assumption that spell-out rules don't see bracketing at all. Instead maybe spell-out is generally cyclic and only the intervention of special structure-flattening operations can make it seem otherwise. But be that as it may, Büring still is committed to the view that both spell-outs are always possible, even if one is more marked. This is enough to make the data I now will present a problem for his theory. The relevant readings in these examples will be strictly impossible, not just dispreferred.

Consider the following scenario[4]: Polly and Larry both are supposed to be in Boston by 8pm at the latest. They are both driving there. It is 5:30pm, and Polly is just setting out from Providence RI, whereas Larry is leaving from New Haven CT, about twice as far from Boston as Providence. Sentence (13) is a true description of this state affairs.

(13) Larry needs to drive faster than Polly needs to drive.

The reason why Larry needs to drive faster is that he needs to cover more distance within the same two and a half hours. Another true statement, in fact a possible paraphrase of (13), is (14).

(14) Polly needs to drive less fast than Larry needs to drive.

Polly needs to drive less fast because she needs to cover less distance. But (15) is not a paraphrase of (13) and (14) and in fact claims something quite different.

(15) Polly needs to drive more slowly than Larry needs to drive.

For (15) to be true, there would have to be some kind of penalty or disadvantage to arriving early. If this is not a feature of our scenario, then (15) is actually false: Polly may drive more slowly, but she doesn't need to. So (15) and (14) differ in truth-value here. Upon reflection, we may judge that (14) could also have been understood to express the same falsehood that (15) does. But the fact remains that (15) does not share the true reading of (14), and this is unexpected if Büring's analysis is right.

Before we look more closely at how this type of case counterexemplifies Büring's predictions, let's have a second example that makes the same point. This is the tale of the sexist boarding school. In the dormitory of this school, rooms are allocated according to seniority. The top-floor single rooms, which are the most attractive and private, are reserved for the oldest pupils. Specifically, they are restricted to girls who are 16 or older and to boys of 14 or older. Commenting on the sexism of this policy, I might truthfully utter (16).

[4]This and the following example were introduced in Heim (2006).

(16) The older pupils get the single rooms on the top floor,
but girls have to be older than boys (to qualify for this privilege).

I might also utter (17) to express the same thought.

(17) ..., but boys have to be less old than girls (to qualify ...).

But if I were to say (18), that would sound quite wrong.

(18) #..., but boys have to be younger than girls (to qualify ...).

Boys don't have to be younger, they just can be! Again, (17) has a true reading which (18) lacks.

A further piece of data concerns the licensing of the German modal *brauchen* ('need'), which is an NPI when taking infinitive complements. The following German translations of (14) and (15) differ in grammaticality.[5]

(19) a. Polly braucht weniger schnell zu fahren als Larry.
Polly needs less fast to drive than Larry
b. *Polly braucht langsamer zu fahren als Larry.
Polly needs slower to drive than Larry

This indicates that some kind of negative element can scope over and license *brauchen* in (19a), but not in (19b).

Büring's analysis does not block the unattested readings of (15), (18), and (19b). Since *slower* and *younger* can spell out the syntactic configuration [**er little**] **fast/old**, it should be possible to have the following derivation for (15).

(20) a. $[\lambda_1$. p needs to ~~p~~ drive $[\text{er little}]_1$ fast]
~~er little~~ than ~~wh~~ $[\lambda_2$. l needs to ~~l~~ drive ~~wh$_2$ fast~~]
b. PF: p needs to drive er little fast than l needs to drive
er little fast > *er slow* (> *slower* or *more slowly*)
c. LF: $[\lambda_1$. need p drive t_1 fast] er little $[\lambda_2$. need l drive t_2 fast]
$\{d: \forall w \in \text{Acc}(@): \text{Speed}_w(p) \geq d\} \subset$
$\{d: \forall w \in \text{Acc}(@): \text{Speed}_w(l) \geq d\}$

[5](14) and (15) can also be translated into German with the modal *müssen* ('must'), in which case the judgments parallel the ones for English: both sentences are grammatical, but only one has the reading true in the scenario.

The meaning of the LF in (20c) is that Polly's required minimum speed is below Larry's required minimum speed. This is the meaning of (13) and is true in the scenario. But intuitively this true reading is unavailable for the *more slowly* sentence in (15). The analysis overgenerates.

What is the difference between the "cross-polar nomaly" case exemplified in (10) above and the current example? Descriptively, it seems that negative antonyms (*short*, *slow*) can spell out a **little** that is semantically composed with the comparative operator, but only as long as no modal operator scopally intervenes between the comparative operator and the adjective. I do not see a natural way to make Büring's analysis sensitive to this distinction. The movement of comparative operators, after all, is covert movement: *-er* is always spelled out in the AP even when its logical scope includes higher operators, and *less* also evidently remains within the modal's surface complement even when the negation in *less* outscopes the modal. (We see this in the true readings of (14), (17).) In covert movement, the copy that is relevant to spell-out is (only) the one at the bottom of the chain. The surface string is effectively determined by the structure that obtains before DegP movement, and this looks the same in (20) as it does in (12): **er**, **little**, Adj start out in exactly the same configuration. PF-operations do not "see" the top of the DegP-movement chain and therefore cannot be sensitive to whether it eventually crosses a modal or not.

5 *little* and its distribution

The juxtaposition of the data in section 4 with the data in section 3 creates a tough dilemma, and I still don't know what is the best way to approach it. The suggestion I will make here is quite tentative and, even if on the right track, would take a lot more work to implement properly. I will start by reformulating Büring's insight about the distribution of crosspolar anomaly as a generalization about the distribution of silent instances of *little*. I will then speculate that this distribution might be understood within a theory of Comparative Deletion, but I do not yet have a concrete idea of what such a theory would be.

Clearly we cannot simply go back to the lexical theory in (2) or fix up Büring's theory by turning the mere preference for one spell-out over the other into an inviolable requirement. Either of these moves would get us the correct predictions about the sentences in (15), (18), and (19), but it would fail to capture the grammaticality of the crosspolar nomaly (10), and it would also fail to predict that *less*-comparatives such as (14) and (17) are actually ambiguous. We need something in between, a theory that permits *less*-α^+-comparatives to express a proper superset of the readings of the corresponding *more*-α^--comparatives. In Heim (2006), I accomplished this by decomposing *less* but not α^-. *less* always spelled out **er** and a scopally mobile **little**, but *short* was just the lexical item **short**. For reasons that will become clearer soon,

however, this proposal is not suited to make sense of Büring's crosspolar nomaly data. So here I will pursue a variation which posits **little** in the sources of both *less* and *short*, though a mobile **little** in one and an immobile one in the other.

Here is my lexicon.

(21) a. $[\![\textbf{long}]\!] = \lambda x.\ (0, L(x)]$
b. $[\![\textbf{er}]\!] = \lambda A.\ \lambda B.\ B \supset A$
c. $[\![\textbf{little}]\!] = \lambda A.\ -A$
d. $[\![\textbf{little*}]\!] = \lambda d.\ \lambda A.\ d \notin A$

The first two entries are the same as in the lexical theory (2), the third is Büring's **little** from (3c), and the fourth is a differently Schönfinkeled variant from Heim (2006). There are no entries for **less** or **short**. These surface forms come about by non-trivial spell-out rules as in (22).[6]

(22) a. **er little*** > *less*
b. **little long** > *short*

little has type <dt,dt> and thus can modify the adjective in the structure [**er** [**little long**]], as in Büring-style derivations like (7) above. **little** cannot move out of this structure (the result would be uninterpretable for any type trace). Nor can **little** enter into the structure [[**er little**] **long**] (because my **er** is not typed to take it as an argument), so it can't hitch a ride that way either. This **little** is therefore frozen in place, and so we capture the fact that the negation in α^- is bound to scope below any modal. We derive the right prediction about (15), (18) and (19b). E.g., (15) has only one derivation, (23), which pairs it with the meaning that is false in our scenario.

(23) a. [λ_1. p needs to ~~p~~ drive er$_1$ little fast]
~~er~~ than ~~wh~~ [λ_2. l needs to ~~l~~ drive ~~wh$_2$ little fast~~]
b. PF: p needs to drive er little fast than l needs to drive
er little fast > *er slow* (> *slower* or *more slowly*)
c. LF: [λ_1. need p drive t_1 little fast] er [λ_2. need l drive t_2 little fast]
$\{d: \forall w \in Acc(@): Speed_w(p) < d\} \supset$
$\{d: \forall w \in Acc(@): Speed_w(l) < d\}$

[6]The spell-out rules in (22) make it look as if we need to distinguish **little** from **little*** at PF. However, this is not really necessary, since we can also rely on syntactic bracketing to make the right distinction. If spell-out is cyclic, it will automatically group **little** with the adjective and **little*** with **er**. (In the alternative of the next footnote, where there only is a single **little**, we have no choice but to rely on bracketing.)

(23c) says that the permissible maximum speed for Polly is below the permissible maximum speed for Larry. In other words, she is not allowed to drive as fast as he is allowed to – not true unless there is a penalty for arriving early.

A different behavior is found with **little***, the item that underlies *less*. This has a type to take the QR-trace of **er** as an argument and form with it another QRable phrase of type <dt,t>.[7] We can therefore generate two different readings for a *less*-comparative like (14), of which one paraphrases (13) and the other (15). The two derivations start with identical pre-movement structures, and the choice point is in the scoping of the **little***-phrase, above or below the modal.

(24) a. $[\lambda_1$. p needs to ~~[er$_1$ little*]~~ $[\lambda_2$. ~~p~~ drive [er$_1$ little*]$_2$ fast]]
~~er~~ than ~~wh~~ $[\lambda_3$. l needs to ~~[wh$_3$ little*]~~ $[\lambda_4$. ~~l~~ drive ~~[wh$_3$ little*]$_4$ fast~~]]

b. PF: p needs to drive er little* fast than l needs to drive
er little* fast > *less fast*

c. LF: $[\lambda_1$. need $[t_1$ little*] $[\lambda_2$. p drive t_2 fast]]
er $[\lambda_3$. need $[t_3$ little*] $[\lambda_4$. l drive t_4 fast]]
$\{d: \forall w \in Acc(@): Speed_w(p) < d\} \supset$
$\{d: \forall w \in Acc(@): Speed_w(l) < d\}$

(25) a. $[\lambda_1$. ~~[er$_1$ little*]~~ $[\lambda_2$. p needs to ~~p~~ drive [er$_1$ little*]$_2$ fast]]
~~er~~ than ~~wh~~ $[\lambda_3$. ~~[wh$_3$ little*]~~ $[\lambda_4$. l needs to ~~l~~ drive ~~[wh$_3$ little*]$_4$ fast~~]]

b. PF: p needs to drive er little* fast than l needs to drive
er little* fast > *less fast*

c. LF: $[\lambda_1$. $[t_1$ little*] $[\lambda_2$. need p drive t_2 fast]]
er $[\lambda_3$. $[t_3$ little*] $[\lambda_4$. need l drive t_4 fast]]
$\{d: \neg\forall w \in Acc(@): Speed_w(p) \geq d\} \supset$
$\{d: \neg\forall w \in Acc(@): Speed_w(l) \geq d\}$

[7]Having to posit two distinct **little**'s is clumsy. I think it could be avoided as follows. Suppose only the **little** of type <dt,dt> exists and we always base-generate the configuration [**er** [**little** [subj Adj]]]. We then can proceed with derivations as in (23), or else we can begin with a short movement of the adjective (including its subject), leaving a trace of type <d,t>. The resulting configuration will be [subj Adj] λP.[**er** [**little** P]]. From this point on, the newly created unit λP.[**er** [**little** P]] can move in the same way as the **little***-phrase in the text (e.g. in (24), (25). It is in fact semantically equivalent to it: after QRing out **er** and leaving a trace of type d, both [d **little***] and λP.[d [**little** P]] express the generalized quantifier λP. d ∉ P. To combine this approach with a natural story about spell-out, it makes sense to regard the movement of the adjective as an overt movement. We can then say that **little** always spells out with the structurally closest other item that is subject to spell-out. If the adjective has stayed in place, this will be the adjective and we obtain the antonym; if the adjective has moved out, the closest other item is **er** and we get **less**.

In general, when *less* surfaces, it spells out a **little***, and the negation in this interacts scopally with clause-mate modals. See Heim (2006) for a broader exposition (as well as Rullmann 1995 and Büring 2007a).

We have captured my data in section 4, but what about Büring's paradigm of crosspolar anomalies and nomalies? Let us warm up with (26), an example that has not presented any difficulty to previous analyses.

(26) The rope is less long than the gap is wide.

(26) worked out fine for Kennedy, when *less* was treated as the primitive comparison operator in (2d), and it worked for Büring, since one of his parses for *less* is effectively an internally complex but otherwise identical counterpart of primitive **less**. What about the present system? Since (26) is not a crosspolar anomaly, it better contain a covert **little** or **little*** inside its *than*-clause. In this theory (unlike Büring's), any occurrences of **little**(*) in comparatives are always within one or the other argument of the comparison operator **er**; there is no option of **little**(*) forming part of the comparison operator itself. Even when we start out with the constituent [**er little***], **er** must eventually strand [**t little***] somewhere in the matrix clause before it reaches a place where it can be interpreted. Therefore, since one **little*** (spelling out in *less*) is manifestly present in the matrix, another matching one in the *than*-clause is needed to meet Kennedy's constraint. The derivation for (26), on its grammatical construal, must be something like (27).

(27) a. $[\lambda_1$. ~~[er$_1$ little*]~~ $[\lambda_2$. r is [er$_1$ little*]$_2$ ~~r~~ long]]
~~er~~ than ~~wh~~ $[\lambda_3$. ~~[wh$_3$ little*]~~ $[\lambda_4$. g is ~~[wh$_3$ little*]$_4$ g~~ wide]]

b. PF: r is er little* long than g is wide
er little* long > *less long*

c. LF: $[\lambda_1$. $[t_1$ little*] $[\lambda_2$. t_2 r long]] er $[\lambda_3$. $[t_3$ little*] $[\lambda_4$. t_4 g wide]]
$(L(r), \infty) \supset (W(g), \infty)$

So far, so good, but how exactly does there manage to be a silent **little*** in the *than*-clause? I could have asked the same question about other *less*-comparatives to which I applied the analysis in Heim (2006). We never saw an overt reflex of the putative second **little*** in any of those examples. But perhaps this was not so mysterious, given that the examples all had some degree of uncontroversial ellipsis in the *than*-clause to begin with, e.g. VP-ellipsis, Comparative ellipsis, or at least Comparative Deletion (an AP-sized or AdvP-sized gap as in (14)). In those cases, then, it was not unreasonable to blame the silence of the second **little*** on whatever ellipsis or deletion process affected the surrounding material. (26) is a bit different in this regard. This looks like a sub-deletion comparative, normally thought to involve no further unpronounced material but the null wh-operator. So why is **little*** deleted there too? I must say that (26) isn't really "sub-deletion" after all (at least not if "sub-deletion" is by definition a structure with

nothing covert but a bare **wh**), but a kind of Comparative Deletion. Even though the adjective, *wide*, has stayed behind, there still is deletion of a larger phrase surrounding the **wh**, namely the *little*-phrase **wh little***. Presumably, this deletes under identity with the matching *little*-phrase in the main clause, in whatever way it is that Comparative Deletion operates.

Now we are all set to turn to the surprising crosspolar nomaly in (10) *The rope is shorter than the gap is wide*. As in (26), the present proposal leaves me only one way to avoid violating Kennedy's semantic constraint: I must posit a covert **little** or **little*** inside the *than*-clause, in order to convert the initial scale-segment denoted by **the gap wide** into a final segment comparable with the one denoted by the main clause **the rope short**. This is where I exploit the assumption that *short* does contain a **little** – not a **little** that scopes around, but still one that can antecede a matching one under Comparative Deletion. The derivation I have in mind is (28).

(28) a. [λ_1. r is er$_1$ ~~r~~ little long]
~~er~~ than [~~[wh little]~~ [λ_2. g is ~~[wh little]~~$_2$ ~~g~~ wide]]

b. PF: r is er little long than g is wide
er little long > *er short* (*shorter*)

c. LF: [λ_1. t_1 r little long]] er [little [λ_2. t_2 g wide]]
(L(r), ∞) ⊃ (W(g), ∞)

Notice that the semantic vacuity of **wh** makes it possible to bracket it with **little** (not just with **little***) and still get an interpretable structure. This derivation yields the correct and non-anomalous meaning.

For the time being, this is the best story I have been able to come up with that reconciles the frozen scope of the negation in α^- (data in section 4) with the crosspolar nomaly of α^-*er than* α^+ (data in section 3). But my confidence in it is limited by my failure to understand the mechanics of Comparative Deletion. There are sophisticated syntactic proposals in the literature, such as Lechner (1999) and Kennedy (2002), but I don't know how to integrate them with the semantic and syntactic assumptions in this paper. This will have to await further research.

Two remarks before closing: It would have been nice not to have to invoke Comparative Deletion or any other specific ellipsis process at all and instead just assume there is a phonetically null **little** which can be generated freely and doesn't need an antecedent. (In that case, we also needn't have bothered to decompose **short** at all.) In its fully general version, this idea wreaks instant havoc. If covert **little**'s could be hiding below the surface wherever they fit into the structure and meaning, every *more*-comparative could be read as a *less*-comparative, and we would predict unattested ambiguity all over the place. Even restricting the silent-**little** option in some commonsensical way, say as a last resort to save a structure from ungrammaticality,

would not have worked. If a silent **little** in the *than*-clause can rescue (10) from anomaly, why not a silent **little** in either the matrix or the *than*-clause to do the same for (9b) **The rope is longer than the gap is narrow*? Clearly, the silent-**little** option must be tightly regulated by the grammar. Büring did away with this problem by not allowing any silent **little**'s at all (except when part of a larger elision including surrounding material); his comparative operator [**er little**] manages to negate two clauses with just a single (overt) **little**. But I have to face the problem in this form, and so I need to put my money on Comparative Deletion or some other appropriately constrained mechanism of recoverable deletion.

My second remark concerns the Rullmann-ambiguity in sentences of the type (8b) *He is shorter than he is allowed to be*. If the present proposal can be made to work for crosspolar nomaly, it will cover these cases too. A high **wh little** in the *than*-clause, if sanctioned by Comparative Deletion under identity with the **little** in *short*, will give us the less-than-maximum-reading. In Heim (2006), I suggested that this reading might have an entirely different source, connected to the same mechanism by which some speakers get an ambiguity even in the *more*-comparative *He is taller than he is allowed to be*. But what I have since learned from Büring's work is that this way out is not general enough. Whether or not it is plausible for the Rullmann examples, it throws no light at all on the crosspolar nomalies. There are no modals in those.

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That is Rosa
Identificational Sentences as Intensional Predication *

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Abstract

This paper presents an analysis of identificational sentences like *That is a woman* and *That is Rosa* as predicational sentences. We argue that the pre-copular demonstrative denotes an individual concept and that the post-copular phrase denotes a sort, in the sense of Gupta (1980): a function from worlds into sets of individual concepts. These sentences provide evidence for a model in which transworld identity is a nontrivial relation and is expressed by nouns.

Copular sentences in which the pre-copular phrase is a demonstrative and the post-copular phrase is a nominal have been classified by Higgins (1973) as identificational sentences.[1] These sentences, exemplified in (1), are used in presentational contexts.

(1) a. That is Rosa.
b. That is a woman.

Higgins (1973) presents identificational sentences as part of his typology of copular sentences. The other three types are exemplified in (2).

(2) a. Rosa is a doctor. Predicational
b. What I don't like about John is his tie. Specificational
c. Hesperus is Phosphorus. Identity

A predicational sentence can be intuitively described as picking out an entity (in (2-a), *Rosa*), and saying about that entity that it has a certain property (in (2-a), *doctor*). A specificational sentence can be characterized as a list with a single entry; here, the title is *What I don't like about John* and the single entry is *his tie*. An identity sentence

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[1]Higgins also treats sentences of the form *That woman is Rosa* as identificational. These sentences are beyond the scope of the present paper.

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like (2-c) expresses identity between the denotations of the pre- and the post-copular phrases.

Higgins suggests that identificational sentences like (1) also express identity. This allows a straightforward account of the fact that the post-copular position is restricted to nominals. However, analyzing identificational sentences as identity sentences does not account for their special use in presentational contexts. Furthermore, the demonstrative pronoun in identificational sentences is exceptional in that it appears to allow reference to humans, contrasting with demonstrative pronouns in other environments. For example, the demonstrative pronoun in (3) cannot be used to refer to humans.

(3) a. #That [$_{VP}$ had lunch outside].
b. #That is [$_{AP}$ tall].

In this paper we present an analysis of identificational sentences as predicational. In section 1 we use Higgins' diagnostics for distinguishing predicational and specificational sentences to argue that identificational sentences are predicational. We derive the special characteristics of identificational sentences from the compositional semantics of the pre- and post-copular phrases. In section 2 we consider the interpretation of the post-copular nominal, introducing Gupta's notion of *sort*; we argue that the post-copular nominals in identificational sentences denote sorts and discuss the implications of sorts for the notion of transworld identity in the model. In section 3 we examine the meaning of the pre-copular demonstrative in the light of our Gupta-style model. In section 4 we combine the pre- and post-copular elements in a compositional semantics and discuss a range of post-copular nominals.

1 Identificational sentences as predicational

Pursuing a different typology of copular sentences, Mikkelsen (2004) proposes that sentences like (1) are a special case of specificational sentences.[2] For Mikkelsen, specificational sentences are inverse predicational structures in which the pre-copular phrase is interpreted as a property and the post-copular expression denotes an entity. Mikkelsen argues that the property denotation of the pre-copular demonstrative pronoun in an identificational sentence is an anaphor whose value is determined by the context, and can be made explicit by a subsequent phrase. In particular, (4) can paraphrase (1) if, for example, the sentences in (1) are uttered at a party.

(4) That is [a woman/Rosa] who is standing by the fireplace.

This analysis maintains the generalization that English demonstrative pronouns are [-human], as the denotation of a demonstrative pronoun in an identificational sentence is a property rather than a (human) individual.

[2]Mikkelsen pursues a different analysis of identificational sentences with a pre-nominal complex demonstrative like *That woman is Rosa*, arguing that they are identity sentences.

If sentences like (1) are indeed specificational, they should exhibit the same syntactic behavior as other specificational sentences. We follow Heller (2005) in testing this prediction using Higgins' (1973) diagnostics for distinguishing specificational and predicational sentences.[3] To this end, the rest of this section applies these diagnostics to the identificational sentences in (1), comparing their behavior to the canonical predicational sentence in (5-a) and the canonical specificational sentence in (5-b).

(5) a. Rosa is a doctor.
b. My next-door neighbor is Rosa.

Deleting the post-copular phrase. Predicational but not specificational sentences allow the post-copular phrase in a coordinate structure to be deleted, as in (6). Identificational sentences pattern with predicational sentences in allowing this deletion (7).

(6) a. Rosa is a doctor and Matilda is too.
b. *My next-door neighbor is Rosa and your next-door neighbor is too.

(7) a. (pointing at pictures) That is Rosa and that is too.
b. That is a woman and that is too.

Deleting the copula. Predicational sentences also differ from specificational ones in allowing the copula to be deleted in a coordinate structure, as in (8). The coordinated identificational sentences in (9) also allow for deleting the copula.

(8) a. Rosa is a doctor and Matilda — a dentist.
b. *My next-door neighbor is Rosa and your next-door neighbor — Matilda.

(9) a. That is Rosa and that — Matilda.
b. That is a woman and that — a man.

Extraction out of the post-copular phrase. Extraction out of the post-copular phrase is more acceptable in predicational sentences (10) than specificational sentences (11). As in the two previous tests, the identificational sentence in (12) patterns with the predicational ones, allowing extraction out of the post-copular phrase.

(10) a. John said that what Mary was looking at appeared to be a picture of a cat.
b. ?What did John say that what Mary was looking at appeared to be a picture of _?

(11) a. They say that what Mary was going to do was give the dog to John.
b. *Who did they say that what Mary was going to do was give the dog to _?

(12) Who did Rosa say that that was a friend of _?

[3]Higgins himself applied these tests only to predicational and specificational sentences.

VP coordination. Finally, predicational sentences allow VP coordination and specificational sentences do not, as in (13). Identificational sentences do not allow VP coordination, patterning this time with specificational sentences.

(13) a. Rosa is a doctor and is very smart.
b. *My next-door neighbor is Rosa and is very smart.

(14) a. *That is Rosa and is very smart.
b. *That is a woman and is very smart.

The fact that identificational sentences like (1) pattern with predicational sentences on three of the four diagnostics presents a serious challenge for Mikkelsen's analysis of (1) as specificational sentences. We take these tests to indicate that identificational sentences are in fact predicational. This leaves us with two puzzles. First, we need to explain why the post-copular position of identificational sentences is limited to nominals. Second, we need to account for the apparent exceptional human denotation of the pre-copular demonstrative pronoun. We take these up in order in the next two sections.

2 The interpretation of nominals

2.1 Two kinds of nominal predicates

Let us compare the identificational sentence in (15-a) with (15-b), which, on the surface, has the same post-copular nominal. At first glance, these sentences seem to have a similar interpretation: the pre-copular phrase picks out an entity and the sentence says about it that it is a camera.

(15) a. That is a camera.
b. The thing I want to buy is a camera.

However, when we examine the syntactic behavior of the two sentences with respect to Higgins' deletion tests (it is not possible to apply the extraction test here) we find that they behave quite differently. While (15-a) is perfectly acceptable in coordinate structures with deletion of the post-copular phrase or of the copula, as in (16), (15-b) is not, revealing that (15-b) does not in fact have a predicational reading.

(16) a. That is a camera and that is too.
b. That is a camera and that — a clock.

(17) a. ??The thing Rosa wants to buy is a camera and the thing Matilda wants to buy is too.
b. *The thing Rosa wants to buy is a camera and the thing Matilda wants to buy — a clock.

The contrast between (16) and (17) is surprising given the intuitively similar meaning of the sentences in (15). It turns out, though, that the sentences in (17) can be improved with the right contextual support. Consider a situation in which Rosa and Matilda are in a cell phone store, shopping for new cell phones and discussing the features of various models. In this context, the salesperson can utter (18-a), and if Rosa likes the cell phone that the salesperson has shown her, (18-b) can be used to describe the situation.

(18) a. The cell phone on the second shelf is a camera.
b. The phone Rosa wants to buy is a camera.

Suppose Rosa has decided to buy a folding cell phone with a camera feature, whereas the more sophisticated Matilda has her heart set on an iPhone. In this context, both sentences in (19) are acceptable, showing that a predicational reading is available.

(19) a. The cell phone Rosa wants to buy is a camera and the one Matilda wants to buy is too.
b. The cell phone Rosa wants to buy is a camera and the one Matilda wants to buy — a web browser.

How is this context different from our original example? Under the most salient interpretation of (17), the entities the sentences talk about are cameras. In the context provided for (19), by contrast, the sentences are not about cameras, but rather objects that have a secondary function as a camera. This contrast can be illustrated if we consider possible answers to the question *What is that?* If the questioner points at one of the gadgets that Rosa and Matilda are considering, the correct answer is *a cell phone*, not *a camera*.

The contrast in acceptability between the sentences in (17) and (19) indicates that this meaning difference has an effect on the syntactic behavior of the sentences, and by extension on their compositional semantics. In particular, *a camera* is a predicate in (19) but not in (17). Equipped with this contrast, let us go back to identificational sentences, and compare the identificational (20-a) with the predicational (20-b).

(20) a. That is a camera.
b. The cell phone Rosa wants to buy is a camera.

Higgins' diagnostics reveal that the post-copular nominal is a predicate in both sentences. Nonetheless, these predicates express a rather different relation to the entity denoted by the pre-copular phrase. In (20-a), *a camera* describes the nature of the entity, providing an answer to the question *What is it?*. In (20-b), by contrast, *a camera* is only a secondary property of the entity. We capture this contrast by assigning a different meaning to *a camera* in the two cases. We propose that the denotation of *a camera* in (20-b) is the standard denotation of predicates: a property at type $\langle s, \langle e, t \rangle \rangle$. In (20-a) *a camera* provides more information. In addition to expressing a property, it tells us something about the essence or nature of the entity. We will call such predicates

quiddity predicates[4] and argue that they denote sorts, in the sense of Gupta (1980). Gupta's (1980) semantics of sorts is based on a conception of transworld identity that differs from what is usually assumed. We discuss the motivation for Gupta's conception of transworld identity in the next section.

2.2 Quiddity predicates and transworld identity

It is well-known in the philosophical literature that analyzing all nominals as properties (at type $\langle s, \langle e, t\rangle\rangle$), in parallel to verbal and adjectival predicates, is problematic, because it leads to problems of transworld identity. In this section, we illustrate this problem by considering the interpretation of *same* and *different*. Let us consider the actual world, where Michelangelo carved the statue David from a certain block of marble, and try to imagine how things might have been different. Two possibilities are characterized by the sentences in (21).

(21) a. David could have been made of a different piece of marble.
b. (Pointing at David) This piece of marble could have been a different statue.

While these sentences are easy to understand, the concepts of *same* and *different* are surprisingly difficult to represent in typical models. Consider Figure 1, where w^* is the actual world.

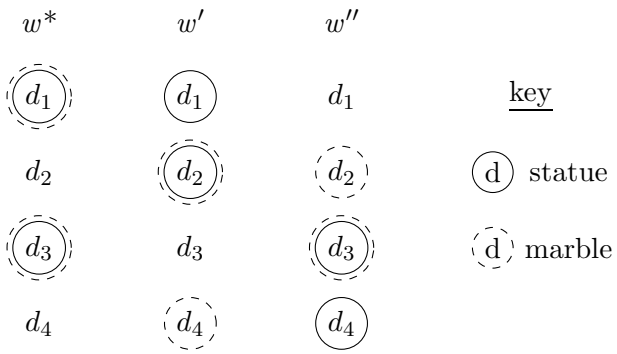

Figure 1: Information represented in a typical model

Suppose that d_3 in w^* is David. In order for (21-a) to be true, there has to be a world in which David is made of a different piece of marble. We can find David in other worlds — d_3 is the same entity throughout — and verify that d_3 is made of marble in w'', but we don't have a way to represent whether d_3 is made of the same marble in w^* and w'' or of different pieces of marble in the two worlds. Similarly, if d_3 in w^* is the referent of the demonstrative in (21-b), then to show that (21-b) is true, we need to find another world where d_3 is made into a different statue. We can easily verify that d_3 is a statue in w'', but we don't have a way to represent whether d_3 is the same statue in w^* and w'' or different statues in the two worlds. The problem rests in the fact that a typical model

[4]We are indebted to Greg Carlson for suggesting this term.

has only a single, trivial principle of identity where every entity is identical to itself, so *being the same statue* cannot be distinguished from *being the same marble*.

The solution proposed by Geach (1962, 1972), and elaborated by Gupta (1980), is to replace the single, trivial principle of identity with multiple, nontrivial principles of identity, as illustrated in Figure 2 (again, w^* is the actual world).

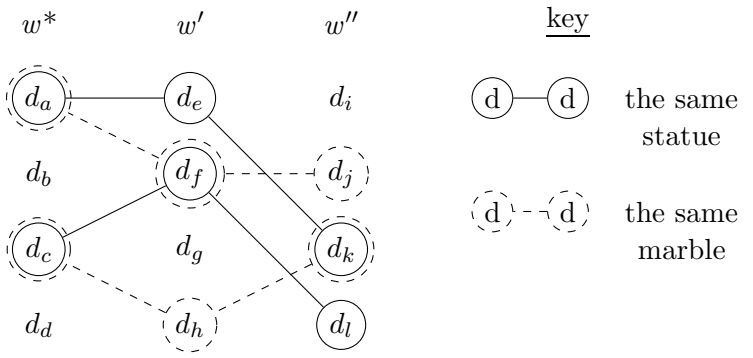

Figure 2: Information represented in a Geach-Gupta style model

The principles of identity for statues and pieces of marble are different: the solid lines connect the corresponding statues across worlds, and the dashed lines connect the corresponding pieces of marble across worlds. This allows us to represent a state of affairs in which d_a in w^* is the same statue as d_e in w', but not the same piece of marble, while d_a in w^* is the same piece of marble as d_f in w', but not the same statue. Note that while the subscripts in Figure 1 are meaningful as they represent the (trivial) principle of identity in a standard model, the subscripts in Figure 2 are not part of the model and are used here for ease of reference.

In a Geach-Gupta model, nouns differ from other predicates in that, in addition to providing a *principle of application*, i.e. saying whether an entity has a certain property, they also provide a *principle of identity*, i.e. provide information that tracks the entity across possible worlds. Gupta (1980) proposes that a "common noun" (roughly what we would consider to be the syntactic complement of a determiner) denotes a *sort*: a function from worlds into sets of individual concepts at type $\langle s, \langle \langle s, e \rangle, t \rangle \rangle$. Suppose we interpret the sort *woman* relative to w; this will give us the set of woman individual concepts in w. The values of these individual concepts relative to w are the women in w. In addition, the individual concepts track the corresponding women across other possible worlds. By definition, the sets of individual concepts are *separated*: two distinct women in one worlds correspond to two distinct women in other worlds and will never collapse into a single woman.[5]

For Gupta, sorts are not predicative, and he analyzes a predicational sentence like *Rosa is a woman* as involving identity, i.e. as *Rosa = a woman*. We depart from Gupta and propose that sorts can, in fact, be predicative. Specifically, we propose that the

[5]Throughout the paper, an individual concept is used to mean a function from worlds into entities (type $\langle s, e \rangle$) and should not necessarily be taken to convey a concept or to return individuals as opposed to other entities.

post-copular nominal in an identificational sentence, which we characterized earlier as a quiddity predicate, denotes a sort. Recall that quiddity predicates provide information that addresses the question *What is it?*. Gupta's sorts capture this kind of information in addition to information about properties by expressing both a principle of identity and a principle of application.

If the predicate of an identificational sentence denotes a sort, this straightforwardly explains why this position is restricted to nouns, excluding VP, AP and PP predicates. This is because only nouns denote sorts, as only nouns provide a principle of identity in addition to the principle of application provided by all predicates.

3 Demonstrative pronouns

If an identificational sentence like *That is a woman* is predicational and the nominal predicate denotes a sort, then the pre-copular demonstrative is predicted to denote an individual concept. Because pronouns, including demonstrative pronouns, are standardly analyzed as referring expressions (denoting entities at type e), our predictions amount to a claim that the demonstrative pronoun in an identificational sentence contributes its intension. We therefore turn now to the intension of demonstrative pronouns.

In his classic work on demonstratives, Kaplan (1977) observes that although demonstrative pronouns are sensitive to speaker demonstrations (or referential intentions) and encode locative features, none of this information is part of the intension of a demonstrative. Consider (22) in a context where there is a gray cell phone near the speaker and a black cell phone farther away, and the speaker is pointing at the black cell phone.

(22) If someone switched the places of the two cell phones...
  a. ...the thing that I would be pointing at would be gray.
  b. ...the thing that would be in that location would be gray.
  c. ...that would be gray.

Intuitively, (22-a) and (22-b) are true, contrasting with the false (22-c). If the intension of the demonstrative pronoun contained information about the speaker demonstration or the relevant locative feature, (22-c) would have a true reading like (22-a) or (22-b).

On Kaplan's account, therefore, information about demonstrations (or speaker intentions) and about the locative features is anchored to the context of utterance, and demonstrative pronouns contribute only an entity to the compositional semantics.[6] The intension of a demonstrative pronoun is a rigid individual concept that, in each relevant possible world, picks out the entity that is identical to the referent in the actual world.

[6]More recent work on demonstratives has challenged Kaplan's view that demonstratives never interact with other elements in the compositional semantics. See King (2001) and Wolter (2006) for alternative approaches to demonstratives.

In a Geach-Gupta model, however, it is not meaningful to talk about rigidity in the same way, since transworld identity is relativized to a nominal sort. We therefore recast Kaplan's treatment of demonstrative pronouns in terms of rigidity relative to a nominal sort. First, the extension of a demonstrative pronoun is an entity that is determined by the context on the basis of a speaker demonstration, exactly like Kaplan's original treatment. The value of the intension in each possible world corresponds to the actual referent; again, just like a standard account. The difference lies in how transworld identity is defined. As a consequence of the nature of transworld identity in this model, the value of the intension is of the same sort in each world, and this is the case even though the demonstrative pronoun itself does not specify the sort of its referent. This is because an entity can only be the same across worlds if it is the same N across worlds. Notice that this recasting of the Kaplanian analysis still predicts that although (22-c) is scopally ambiguous, the two readings are semantically equivalent and false.

The demonstrative meaning sketched above places no restrictions on the sort of the referent, providing a way of understanding why a demonstrative pronoun can refer to a human in a sentence like *That is a woman.* The context in which this sentence would be uttered is such that the demonstrated entity is either hard to see or highly androgynous. In other words, it will be uttered in a context where it cannot be assumed that the interlocutors are able to infer the sort of the demonstrated entity. This is exactly what our demonstrative meaning does: places no restriction on the sort of the entity.

The obvious question is whether this demonstrative meaning is specific to presentational contexts. If this is the meaning of demonstrative pronouns across the board, one has to explain why demonstrative pronouns normally cannot be used to refer to humans. While a complete answer to this question is beyond the scope of this paper, our direction begins with the observation that there are special personal pronouns that refer only to humans, such as *she*. We believe that the existence of these pronouns limits the use of demonstrative pronouns that refer to humans to those special contexts where personal pronouns cannot be used. Preliminary evidence for this line of analysis comes from the fact that sentences like (23) cannot be used in presentational contexts.

(23) (pointing) She is Rosa.

This suggests that a complete analysis of the distribution of demonstrative pronouns requires a better understanding of the distribution of personal pronouns.

4 Composing identificational sentences

Having argued for the meaning contributed by the different parts of identificational sentences, we are now in a position to combine these in a compositional analysis of (24).

(24) That is a woman.

The post-copular noun *woman* denotes a sort, or function from worlds into sets of individual concepts, as shown in (25). (25-a) guarantees that the extension of each individual concept is a woman. (25-b) provides the principle of identity for *woman*. Finally, (25-c) makes sure that each woman in one world corresponds to one woman in another world, formalizing the intuition that two woman cannot collapse into one.[7]

(25) $[\![\text{woman}]\!]^{M,w*,g}$ (type $\langle s, \langle \langle s, e \rangle, t \rangle \rangle$) The function from worlds w to sets of individual concepts I such that:

a. For each individual concept i in I, $i(w)$ is a woman
b. For all w', w'' such that $i(w')$ and $i(w'')$ are defined: $i(w')$ is the same woman as $i(w'')$
c. For all individual concepts i, i' that belong to $[\![\text{woman}]\!]^{M,w*,g}$ at world w, if at some w', $i(w') = i'(w')$ then $i = i'$. [separation][8]

The pre-copular demonstrative pronoun contributes an individual concept at type $\langle s, e \rangle$, as in (26). (26-a) takes this individual concept to be a variable whose value is assigned by the context and (26-b) makes sure that the value of this individual concept in the actual world w^* is the entity demonstrated (or otherwise intended) by the speaker. (26-c) deals with the value of the individual concepts in other worlds. Remember that this individual concept denotes at each world the entity that corresponds to the entity in the actual world, but without specifying a noun that would provide the principle of identity. Imagine this individual concept can find in other worlds the entity that corresponds to the entity demonstrated in the actual world: then, by definition, this individual concept must be a member of some N (relative to the actual world w^*). The restriction is therefore that this individual concept is a member of the grand union of all sets of individual concepts that make up the meaning of all nouns.

(26) $[\![\text{that}]\!]^{M,w*,g}$ (type $\langle s, e \rangle$): i, such that

a. the value of i is determined by the contextually provided assignment function g
b. $i(w*)$ is demonstrated by the speaker in the context of utterance
c. i is a member of the grand union of nominal sorts S relativized to w^*.

The actual composition is shown in Figure 3. When the sentence is composed, the post-copular phrase is relativized to the actual world, just like other main predicates. Following standard assumptions for predicational copular sentences, we take the post-copular phrase to apply directly to the pre-copular phrase by function application (Partee 1987). The details of the contribution of the copula and the indefinite article depend on more general assumptions about copular sentences, which we will not discuss here.

[7]Note that (25) requires that all entities will exist in all worlds, which of course is a simplification. See Gupta (1980) for treatments of non-existent objects.

[8]Gupta (1980) adopts a stronger requirement where separation is not relativized to a world w: see p. 29ff for discussion.

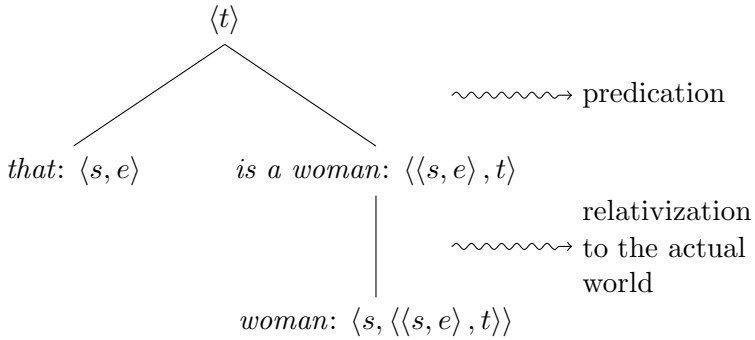

Figure 3. Composing *That is a woman*

All in all, the meaning of an identificational sentence is such that it makes explicit the sort relative to which the demonstrated entity may be tracked across possible worlds.

We are now in a position to tie up a loose end from section 1. Recall that on the final diagnostic we considered for distinguishing predicational and specificational sentences, identificational sentences differ from canonical predicational sentences in not allowing VP coordination. On our analysis, the unacceptability of (14-b) is simply a type mismatch between the sort-denoting *woman* and the property-denoting *very smart*.

4.1 Proper names

As shown in example (27) and the title of our paper, proper names are one kind of post-copular nominals found in identificational sentences.

(27) That is Rosa.

For our analysis to apply to sentences like (27), proper names must have a sort denotation. But, standardly, proper names denote entities, and their intensions are rigid individual concepts (Kripke 1982). Our goal, then, is to examine whether there is a sort denotation that would maintain standard assumptions about the meaning of proper names.

As discussed earlier, rigidity in a Geach-Gupta model is relativized to a sort. If we want a proper name to denote an entity that is the same N across worlds, what would that N be? It is not desirable to base this sort on some common noun or a complex description, because that would amount to the description theory of proper names. If we use the name itself as the sort we avoid these problems. Evidence that proper names express a principle of identity — the defining characteristic of sorts — comes from (28), where proper names combine with *same*/*different* in a meaningful way (see again section 2.2).

(28) a. This is the same Rosa we talked about yesterday.
b. This is a different Rosa from the one we talked about yesterday.

Treating names as sorts gives us the denotation for *Rosa* shown in (29).

(29) $[\![\text{Rosa}]\!]^{M,w*,g}$ (type $\langle s, \langle \langle s, e \rangle, t \rangle \rangle$): the function from worlds w to sets of individual concepts I such that:

a. For all individual concepts i in I, $i(w)$ is Rosa
b. $\forall w', w''$ s.t. $i(w')$ and $i(w'')$ are defined: $i(w')$ is the same Rosa as $i(w'')$.
c. For all individual concepts i, i' that belong to $[\![\text{Rosa}]\!]^{M,w*,g}$ at world w, if at an arbitrary w', $i(w') = i'(w')$ then $i = i'$. [separation]

The condition in (29-a) guarantees that the name picks out Rosa. (29-b) ensures that the same Rosa is picked out in each world. Note that nothing requires the set of individual concepts denoted by a proper name to be a singleton, allowing there to be more than one Rosa. Since transworld identity depends on a principle of identity provided by the name itself, the denotation of a proper name can collect all the individual concepts corresponding to the bearers of the name while maintaining the correct transworld identity relations. That is, allowing more than one bearer of a name does not compromise rigidity.[9]

In addition, treating names as sorts that may denote non-singleton sets of individual concepts sets the stage for a straightforward explanation of cases like (30), in which more than one person must bear the name *David*. This gives us an advantage over standard approaches to proper names, which must treat the proper names (30) as exceptional.

(30) a. In my family, there are at least five Davids.
b. Last night I met with (the) David from Oslo.

In sum, a sort denotation of a proper name: (i) is rigid (albeit in the somewhat different sense of rigidity given by the Geach-Gupta model) (ii) maintains an arbitrary or causal connection between a name and the individual it picks out, and (iii) allows for more than one bearer of the same name. This approach lays the groundwork for a unified treatment of ordinary uses of names and cases like (28) and (30). We leave the further development of this theory for future research and turn back to identificational sentences.

4.2 Stage-level nouns

Up to this point we have used Gupta's (1980) term "common nouns" without being explicit about what nominals are intended. For Gupta, this class does not include stage-level nouns like *passenger*, which denote spatio-temporal slices of individuals (Carlson 1977). Note that counting passengers is different from counting people: one person can correspond to more than one passenger at different points in time, as illustrated by the invalid argument in (31).

[9] As with common nouns, we need the separation condition in (29-c) to ensure that one Rosa in one world will not correspond to two Rosas in another.

(31) a. National Airlines served at least two million passengers in 1975.
b. Every passenger is a person.
c. Therefore, National Airlines served at least two million persons in 1975.

Gupta argues that stage-level nouns do not belong to the class of "common nouns" because they do not provide a principle of identity like individual-level nouns. Indeed, stage-level nouns are not acceptable out of the blue as complements of *same*, as shown in (32), suggesting that nouns like *passenger* do not express principles of identity.

(32) #This is the same passenger as that one.

Furthermore, if we can come up with a context where *being the same passenger* is interpretable, it seems to depend on the identity of individuals. For example, a security guard who utters (33) conveys that he has encountered the same person two days in a row, not that he has encountered the same passenger-stage.

(33) Security guard: That's the same passenger I searched yesterday.

But we would not expect *passenger* to express the same principle of identity as *person*, as we have seen that passengers and people are counted differently.

Combining Gupta's observations about the lack of a principle of identity for stage-level nouns with our analysis predicts that stage-level nouns will not be licensed in identificational sentences. Indeed, (34) is quite odd.

(34) #That is a passenger.

However, (34) can be improved with the right contextual support, where the demonstrated individual displays the characteristic behavior of passengers. For example, suppose I am at the airport with a small child. A man is boarding an airplane, ticket in hand, while another man is standing nearby in a pilot's uniform. In this context (35) is perfectly acceptable.

(35) Look, Johnny. That is a passenger. And that is a pilot.

In this context, the speaker seems to be demonstrating stages rather than individuals. That is, it is the time-slices of individuals that have the characteristic properties of passengers and pilots, not entities.[10] Given that we have seen that stage-level nouns do not seem to provide a principle of identity, which is the defining characteristic of sorts, we are led to treat sentences involving the demonstration of stages separately from sentences involving the demonstration of individuals.

[10]See Carlson (1991) for an analysis of identificational sentences based on the assumption that speakers demonstrate stages.

Independent evidence for this approach comes from demonstrated non-individuals with non-nominal predicates. For example, although (36) below is unacceptable when the speaker points at a human out of the blue, it becomes better in a context where the interlocutors are arguing about the standard of tallness, as in (37).

(36) (pointing at a person) #That is tall.

(37) Rosa: Anyone over 1.8 meters counts as a tall person.
Matilda: Nonsense. People who is 1.9 meters are merely average.
Matilda (pointing at a 2.1-meter-tall person): Now THAT is tall.

Intuitively, in (37) Matilda does not really demonstrate the tall person, even though she is pointing toward that person. Instead, she seems to demonstrate an example of tallness (similar examples may be constructed with post-copular PPs and gerunds). The fact that sentences where stages and other abstract objects are demonstrated allow post-copular expressions other than nominals suggests that these differ from the identificational sentences we have concentrated on in this paper.

5 Conclusions and implications

We have presented an analysis of identificational sentences with three components. First, based on evidence from Higgins' (1973) syntactic diagnostics for the predicational vs. specificational distinction, we argued that the relation between the pre- and post-copular phrases in identificational sentences is one of predication. Second, we argued that the post-copular phrase in an identificational sentence denotes a sort, allowing us to capture the difference between ordinary predicates and quiddity predicates, and we showed how this analysis applies both to common nouns and to proper names. Finally, we showed that the pre-copular demonstrative can be taken to contribute an unsorted individual concept while maintaining a Kaplanian analysis of demonstrative pronouns.

Our analysis opens up a number of new questions that bear upon central issues in semantics. With regard to demonstratives, one question is whether the unsorted denotation we have adopted is peculiar to presentational contexts or more generally available, and to what extent the interpretation of demonstrative pronouns depends on the availability of personal pronouns. A related question concerns the status of demonstrated stages as contrasted with demonstrated entities. With regard to the typology of copular sentences, we are left with the question of whether sentences like *That woman is Rosa*, with a pre-copular complex demonstrative, are amenable to the analysis developed here.

The biggest new questions, though, concern the implications of the Geach-Gupta model for the interpretation of nominals. Our analysis succeeds in drawing parallels between common nouns and proper names; we should now consider how these differ. More generally, we have shown that there are two kinds of predicate nominals — ordinary predicates and quiddity predicates — and there is a typology beginning to emerge of nominals that have one or the other or both meanings. We have encountered ambiguous

nouns like *camera* with both readings, stage-level nouns like *passenger* that appear to express ordinary predicates only, and proper names like *Rosa* that so far we have only seen expressing quiddity predicates. We believe that it is of great interest to continue to explore how nominals in English and other languages fit into this emerging typology.

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Different Alternatives for Topics and Foci: Evidence from Indefinites and Multiple *wh*[*]

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Abstract

In gapping, topical indefinites as well as *wh*-phrases can contrast with surface-identical antecedents if the contrast involved is the first of the two (or more) contrast pairs in the gapping coordination. This is not possible for most other types of expressions. We argue that both topical indefinites and *wh*-phrases introduce a discourse referent with a fixed address, on the basis of which referents introduced by surface-identical expressions can be contrasted. For the indefinites, we argue that the first contrast pair is a pair of contrastive topics which can, at the same time, be a pair of aboutness topics. These introduce individual addresses (Reinhart 1981). For *wh*-phrases we follow the assumption that they introduce discourse referents by presupposition. Multiple *wh*-interrogatives then introduce functions by presupposition whose domain is provided by the first *wh*-phrase. The function is specified by giving its extension, i.e. the respective pair-list.

1 Introduction

In this paper we explore alternative sets in contrastive constructions and argue that different information structural units can come with different alternative sets, more specifically, the alternatives coming with (contrastive) topics can be different from the ones coming with (contrastive) foci. This is surprising for some accounts of contrastive to-

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pics (e.g. Büring 1997, 2003) and calls for an analysis of alternative formation that takes into account the specifics of topics and foci.

Our test case are sentences with gapping, which is an ellipsis type that typically involves two pairs of contrasting elements, see (1) for a German example. The contrasting elements are *student-lecturer* and *director-dean*. Small caps indicate pitch accents, a forward slash marks a rising accent, a backward slash marks a falling accent.

(1) Ein Stu/DENT schrieb dem Di/REKtor und ein Do/ZENT dem De\KAN.
a student wrote the director and a lecturer the dean
'A student wrote to the director and a lecturer to the dean.'

In some cases, surprisingly from the viewpoint of ellipsis, there is no contrast required on the surface for one of the contrast pairs. The two conjuncts in (2) have surface-identical[1] indefinite subjects. In (3) we find surface-identical *wh*-phrases as subjects:

(2) /EIn Student schrieb dem Di/REKtor und /EIn Student dem De\KAN.
one student wrote the director and one student the dean
'One student wrote to the director and one student to the dean.'

(3) /WELcher Student las welches /BUCH
Which student read which book
und /WELcher Student welchen Ar/TIkel
and which student which article
'Which student read which book and which student which article?

Obviously, there IS a contrast here – we understand these sentences as involving different student individuals. As the translations indicate, the effects are the same in English.

In (2) and (3), the surface-identical contrast pair is the first of the two contrast pairs. In (4) and (5) below, it is the second. In the German data (4a, 5a), subject and object are swapped, which in general is possible because of the relatively free word order and the lack of superiority effects in German. The English cases in (4b, 5b) are adapted so that the order of subject and object is maintained. In either case, the result of placing the surface-identical contrast pair behind the other contrast pair is ungrammatical.

(4) a. *Dem Di/REKtor schrieb /EIN Student und dem De/KAN \EIN Student.
b. *The di/RECtor wrote to /ONE student and the /DEAN to \ONE student.

(5) a. *Welches /BUCH las /WELcher Student und welchen Ar/TIkel /WELcher Student?
b. *Which /STUdent read /WHICH book and which /TEAcher /WHICH book?

[1]The pitch accents are (can be) the same for the two subjects (typically L*H). The second conjunct normally occurs with register down step, see e.g. Féry & Hartmann (2005). We gloss over this aspect.

It is often assumed that the contrastive elements in gapping are foci (e.g. Hartmann 2000) but some analyses suggest that the first contrast pair is a pair of (contrastive) topics, and the second, a pair of contrastive foci (Repp 2005; Winkler 2005). We show that this latter position is what our data reflect with the addition that the contrastive topics can also be aboutness topics. These are different from contrastive topics in the sense of e.g. Büring (1997, 2003), for which the alternative set is built in the same way as for contrastive foci. Aboutness topics can take recourse to different alternative sets from Büring's contrastive topics when contrasted. This is because they always are linked to 'fixed' discourse referents whereas foci are not. Similarly, *wh*-interrogatives introduce discourse referents whose reference is fixed: like aboutness topics, they have an address.

2 Topical indefinites and contrast

2.1 Marking the indefinite as topical

The data in (2) have some features which deserve closer attention. In the German sentence, the indefinites carry a rising accent on the determiner. This is not the case in the run-of-the-mill gapping example in (1). Indeed, for (2) to be felicitous, the determiner must be accented, cf. (6a,b). Similarly, the English variant (= the translation of (2)), needs accented *one* (or unaccented *some*) rather than *a* (accented or not), see (6c):

(6) a. *Ein Student schrieb dem Di/REKtor und ein Student dem De/KAN.
b. *Ein Stu/DENT schrieb dem Di/REKtor und ein Stu/DENT dem De\KAN.
c. *A student wrote to the di/RECtor and a student _ to the \DEAN.

An obligatory accent on the determiner in German has been observed to be typical of topical indefinites (e.g. Endriss 2006; Gundel 1985; Jacobs 1996 (i-specification); Molnár 1993; Umbach 2004). Non-indefinite topics are usually deaccented because they are given. Topical indefinites are new. This is marked with an accent on the determiner. Also, an accent on the determiner has been observed to occur in constructions where the indefinite takes wide scope over other operators (Endriss 2006), or, depending on the theory, where the indefinite is interpreted as specific. The same holds for the determiners *one* and *some* in English (e.g. Fodor & Sag 1982; Pafel 2005). Wide scope and specificity have been associated with aboutness, i.e. indefinite topics often are specific and always take wide scope (Endriss 2006). Consider (7), as well as (8), which is the direct translation of (7), adapted from Endriss (2006: 85f.). In the a-cases, the indefinite *a mathematician* takes narrow scope with respect to *none of my friends*. In the b-cases, in contrast, it is much easier for the indefinite to take wide scope.

(7) a. Keiner meiner Freunde lud einen Mathematiker zu seiner Party ein.
b. Keiner meiner Freunde lud /EInen Mathematiker zu seiner Party ein.
none of.my friends invited a/one mathematician to his party PART

(8) a. None of my friends invited a mathematician to his party.
b. None of my friends invited some/one mathematician to his party.

2.2 Different kinds of determiners

Another piece of evidence for the aboutness topichood of the first contrast pair in gapping comes from the kind of determiners that can occur in this position. These are essentially the indefinite article and unmodified numerals. Quantificational DPs headed by other determiners can only be felicitously contrasted if there is a surface contrast:

(9) a. Three children chose the book and three (children) the CD.
b. *Less than three children chose the book and less than three (children) the CD.
c. Less than three children chose the book and less than four (children) the CD.

The quantifiers that are happy with contrast under surface identity are those quantifiers that can occur in left dislocation constructions in German, which have been suggested to mark the left dislocated element as an aboutness topic (Frey 2005):

(10) /DREI Kinder, die kennt doch jeder: Heidi, Alice und Kevin.
three children them knows PART everyone Heidi, Alice and Kevin
'Three children, everybody knows them - Heidi, Alice und Kevin.'

(11) *Weniger als /DREI Kinder, die kennt doch jeder.
'Less than three children, everybody knows them.'

According to Ebert & Endriss (2004), these quantificational determiners can occur in topical DPs because a discourse referent can be formed from them: the minimal witness set, MWS, (Barwise & Cooper 1981) of these quantifiers delivers a 'sensible representative', i.e. sets are available which can be turned into (atomic or sum) individuals. For instance, *three children* is the set of all sets containing three children and a corresponding MWS is a set containing three children and nothing else. This is a sensible representative. The sum individual consisting of the three children contained in the MWS can function as the topic. For *less than three children*, the (in this case: unique) MWS is the empty set. This is no sensible representative. Consequently, no discourse referent can be formed. The quantifier cannot occur in a topical DP.[2]

[2]We simplify the analysis by Ebert & Endriss (2004). They can also account for DPs containing e.g. *at least* or *more than* which cannot be topical but for which the MWS delivers a sensible discourse referent.

2.3 Topical indefinites, address creation and contrast

We assume with Reinhart (1981) that topics are discourse referents with a discourse address. For topical indefinites, which introduce novel discourse referents, this means that they fix an address for a discourse referent. This is crucial – it is not sufficient to rely on the mere introduction of a discourse referent. Any indefinite can do that. This is Heim's (1982) novelty condition:

(12) Harvey read a book and Pete read a book.
a. The books were by Konsalik
b. #The book was by Konsalik.

Yet, while it is possible to be ignorant about the referential address of 'ordinary' indefinites – there is none –, this is impossible for topical indefinites. (13a), with non-topical indefinites, can be followed by a clause like (14). (13b), with topical indefinites, cannot.

(13) a. Max hat ein Buch gelesen und Maria hat ein Buch gelesen.
Max has a book read and Maria has a book read
'Max read a book and Maria read a book'
b. /EIN Buch hat \MAX gelesen und /EIN Buch hat Ma\RIa gelesen.
One book has Max read and one book has Maria read
'One book, Max read and one book, Maria.'

(14) Maybe it was the same one. (ok after (13a), but not (13b))

Note that 'knowing the discourse-referential address of an indefinite' is meant to capture the distinctness of referents and not their actual identity. The referent itself might be unknown to the speaker (cf. Endriss 2006):

(15) If some relative of mine dies, I get rich. I wonder who that might be.

The address-establishing act can be carried out several times. During address creation, a label is created for each of these individuals, and the comment coming with the topic is stored under the address. When we contrast topical indefinites we contrast the individuals that are created on the basis of the denotations of the respective quantificational DPs.[3] Thus, a sentence like (2), repeated below in English as (16), is interpreted as shown in (17). Note that the minimal witness sets are assumed to be introduced by a separate speech act. What is contrasted are the assertions.

(16) One student wrote to the director and one student to the dean.

[3]Eckardt (2002) investigates the alternatives that are available to topics with accented determiners and concludes that one must distinguish referential topics from denotational topics. Referential topics have discourse referents in their alternative sets, denotational topics have denotations in their alternative sets.

(17) wrote_to_director($\sum${x: a(x)}) $\wedge$ wrote_to_dean($\sum${x: b(x)})
where a and b are the respective minimal witness sets

In contrast to topical indefinites, topical definites cannot be contrasted without a denotational contrast:

(18) a. *The /BOY is reading Tom /SAWyer and the /BOY Harry \POTter.
b. */THE boy is reading Tom /SAWyer and /THE boy Harry \POTter.

This is because topical definites pick up addresses that are already in the discourse model. These addresses are identified via the linguistic expressions. If they are the same the addresses are the same: definite expressions come with a uniqueness condition. As we saw above (ex. 6), non-topical indefinites can neither be contrasted without denotational contrast: they do not establish an address that could be contrasted with another address. On the other hand, contrast between discourse referents which on the surface are identical is not reserved for indefinite topics. Under specific circumstances it is also available for foci. For instance, referential contrast can be evoked with an accent on demonstrative determiners (here synonymous with the definite determiner) if combined with deictic gestures, e.g. the speaker in (19) must point to two different biscuits:

(19) Ich will nicht [/DEN Keks $_{FOC}$], sondern [\DEN (Keks) $_{FOC}$].
I want not the biscuit but the biscuit
'I don't want this biscuit but that one.'

Correction structures like (19) are generally held to involve focus (Jacobs 1991; Drubig 1994; Repp 2005). (19) is felicitous because demonstratives are directly referential, which means that the two demonstratives here denote two different individuals. Another case where focus alternatives can be surface-identical is when they are bound pronouns as in (20). (20) is a gapping example. As mentioned above, we assume that the post-gap material is focal. The two pronouns *his* and *his* are bound by two referentially different antecedents. This automatically makes them referentially distinct:

(20) /PEter called /HIS son and /JOHN \HIS son.

Thus, for focus alternatives to be able to contrast without surface contrast, it is necessary that either the focused elements are directly referential themselves or that they are made referentially distinct via binding to different referents.

3 *Wh*-questions

3.1 Common features of indefinites and *wh*-phrases

We said that topical indefinites first establish a discourse address, and then some information is stored under this address. Some researchers have suggested that this can be captured via presuppositions (e.g. Reinhart 1981; Cresti 1995; Yeom 1998; Portner & Yabushita 1998). The idea is that topical indefinites presuppose their existence and that these presuppositions update the common ground first. This opens up an interesting parallel with *wh*-interrogatives. Many analyses of interrogatives assume that a *wh*-phrase introduces a referent by presupposition (e.g. Comorovski 1996; Dayal 1996; Karttunen 1977; Hintikka 1978). Also by presupposition, the interrogative says something about the referent, e.g. in (21) *x called John.* [4]

(21) Who called John? *presupposes:* Someone called John.

Importantly, the interrogative requires that more be said about the referent, that its denotation be revealed. Thus, something like an address is created under which the information to be supplied by the answer is to be stored.[5] This explains why a *wh*-phrase can be form-identical in gapping, see (22).

(22) Who called John and who Mary?

A new address is created for every *who*. This does not explain, however, why there is an asymmetry in a multiple *wh*-question between the first *wh*-phrase and the second one, which will be the topic of the next subsection.[6]

[4]These data are not undebated (e.g. Groenendijk & Stokhof 1984; Ginzburg 1995), mainly because of examples like *Who called John? – Nobody called John.* We consider these as instances of presupposition protest (also see the above references). Haida (2003) offers (i) as a crucial piece of evidence in favour of a presuppositional analysis: A *who*-question cannot be answered by the indefinite *somebody* because the existential meaning comes already with the question:

(i) Who called John? – *Somebody called John.

[5]The presuppositions introduced by topical indefinites and those introduced by *wh*-phrases differ here. For topical indefinites only the existence of the individual corresponding to the topic expression is presupposed. For *wh*-phrases the existence of the individual corresponding to the *wh*-expression is presupposed and this individual is further restricted by what is predicated of it in the interrogative. Another difference is that the individuals introduced by the *wh*-words in a conjoined question like (22) in the main text can be identified as being the same in an answer, e.g. *Peter did*. This is not surprising given the ignorance of the person asking the question about the respective referents.

[6]The idea that *wh*-phrases and indefinites have much in common is of course not new. It is well known that *wh*-phrases can serve as antecedents for anaphora, see for instance (i). Comorovski (1996) speculates that the presupposition introduced by the *wh*-question is responsible for this. In various languages indefinite pronouns can serve as ordinary indefinites or as question terms, depending on prosodic or morphological marking. Also see Haida (2007) on this.

(i) Who$_i$ polished this cupboard and which polish did he$_i$ use? (Comorovski 1996)

3.2 Multiple *wh*-phrases

Consider the example in (23), which, in its pair-list reading presupposes that there is a set of kisser-kissed pairs. The identity of these pairs is to be provided by the answer.

(23) Who kissed whom?

For a gapping case like (24) this reads as follows: (24) presupposes that there is a set of people such that each member of this set kissed a Berliner and there is a set of people such that each member of this set kissed a Londoner, i.e. there is a *Kisser-Kissed Berliner* and a *Kisser-Kissed Londoner* pair-list.

(24) Who kissed which Berliner and who which Londoner?

We assume that multiple *wh*-questions ask for a function whose domain is provided by the fronted *wh*-question, as given schematically in (25). *f* is the function asked for, *Dom(f)* is the domain of this function and *Z* is the relation holding between the elements in the domain and the range of the function (Higginbotham & May 1981; Krifka 2001). The function is then specified by giving its extension, i.e. the respective pair-list.

(25) $\lambda Z \lambda f.\ \forall x[x \in \mathrm{Dom}(f) \rightarrow Z(f(x))(x)]$

There is a clear connection between this analysis and Kuno's (1982) sorting key hypothesis, according to which the relative order of the *wh*-terms in a multiple *wh*-question is mirrored by the answer. This can be seen as a consequence of the fact that the first *wh*-term provides the domain of the function, while the second provides the range.

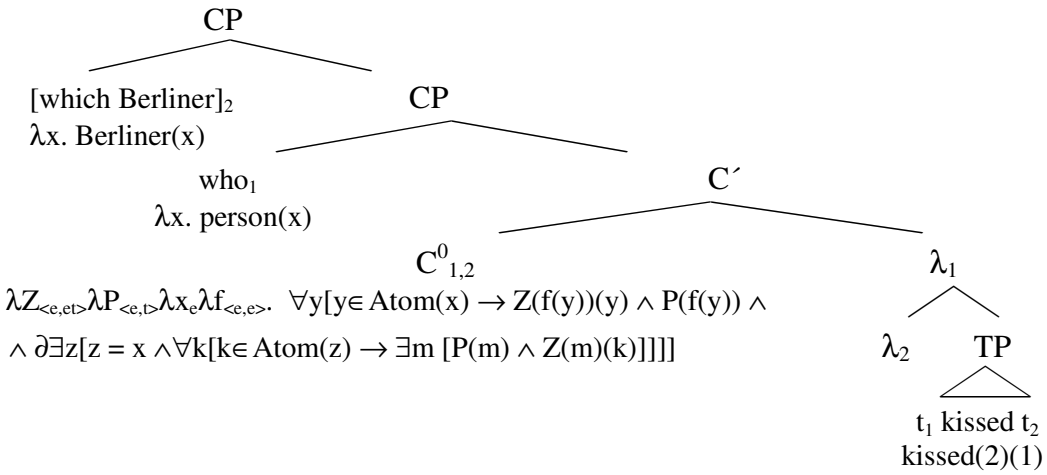
Let us turn to the details of our analysis of multiple *wh*-questions. First, we assume *wh*-terms to be of type <e,t>, e.g. *who* denotes the predicate *λx. person(x)*. Second, we assume that the *wh*-term left in situ at the surface moves at LF, adjoining directly above the overtly fronted one. The traces left behind by both are interpreted as free variables of type *e*. Third, we assume that the covert operator present in the C-head of multiple *wh*-questions denotes the object given in (26). The presupposition discussed above is combined with the truth conditional content via Beaver's (2001) presupposition operator ∂, i.e. the condition to which ∂ has been prefixed is presupposed, not asserted.

(26) $\lambda Z_{<e,et>} \lambda P_{<e,t>} \lambda x_e \lambda f_{<e,e>}.\ \forall y[y \in \mathrm{Atom}(x) \rightarrow Z(f(y))(y) \wedge P(f(y)) \wedge$
$\wedge\, \partial \exists z[z = x \wedge \forall k[k \in \mathrm{Atom}(z) \rightarrow \exists m\ [P(m) \wedge Z(m)(k)]]]]$,
where *Atom* is the function mapping a plural entity onto its atomic parts.

The LF of the first conjunct of (24) is given in (27). Note that the covertly moved *wh*-term, i.e. the one providing the predicate to be satisfied by the elements in the range of the function (*which Berliner*), retains its original type to combine with the operator in

C^0, to whose maximal projection it is adjoined at LF. The overtly moved *wh*-term, which provides the domain of the function, in contrast, is shifted to an object of type *e*. This is because it moves to a topic position, see Jaeger (2004) and Grohmann (2006) for empirical arguments that overtly fronted *wh*-terms are topics. Accordingly, elements located in this position have to be of the type of individuals, as argued in section 2.2.

(27) Who kissed which Berliner?



The shift to an individual is done via a covert sigma-operator which applies to the set denoted by the *wh*-term and returns the maximal element contained in that set. Furthermore, we assume that σ, whose overt counterpart is the definite determiner, just like this determiner comes with a covert C(ontext)-variable. This gets resolved to a contextually salient predicate (see von Fintel 1994 for arguments that quantificational determiners as well as adverbial quantifiers introduce such variables). The (denotation of the) *wh*-term in Spec., CP above is thus shifted as given in (28):

(28) $\lambda x.\ person(x) \Rightarrow \lambda P.\ \sigma\{x: P(x) \wedge C(x)\}\ (\lambda x.\ person(x)) =$
$\sigma\{x: person(x) \wedge C(x)\}$

Note that λ-abstraction over the variables denoted by the traces of the two *wh*-terms is triggered not directly below the respective moved item (as in Heim & Kratzer 1998), but directly below the operator in C^0, thus creating the relation *Z* this operator combines with first. We suggest that this is because the operator in C^0 is coindexed with the two *wh*-terms. The sister of the operator in C^0 thus translates as *λyλx. kiss(y)(x)*, and the LF in (27) can be interpreted as shown in (29):

(29) $\lambda Z_{<e,et>}\lambda P_{<e,t>}\lambda x_e\lambda f_{<e,e>}.\ \forall y[y\in \text{Atom}(x) \rightarrow Z(f(y))(y) \wedge P(f(y))$
$\wedge\ \partial\exists z[z = x \wedge\forall k[k\in \text{Atom}(z) \rightarrow \exists m\ [P(m) \wedge Z(m)(k)]]]$
$(\lambda y\lambda x.\ \text{kiss}(y)(x))\ (\sigma\{x:\ \text{person}(x) \wedge C(x)\})\ (\lambda x.\ \text{Berliner}(x)) =$

$\lambda f<e,e>.\ \forall y[y\in \text{Atom}(\sigma\{x:\ \text{person}(x) \wedge C(x)\}) \rightarrow \text{kiss}(f(y))(y) \wedge \text{Berliner}(f(y))$
$\wedge\ \partial\exists z[z = \sigma\{x:\ \text{person}(x) \wedge C(x)\} \wedge\forall k[k\in \text{Atom}(z) \rightarrow \exists m\ [\text{Berliner}(m)$
$\wedge\ \text{kiss}(m)(k)]]]]$

The C-variable in the denotation of the (type-shifted) topical *wh*-term in Spec,CP is resolved in the following way. It is well known that C-variables in the restrictor of adverbial quantifiers are resolved on the basis of presuppositions introduced by lexical material contained within the respective clause (Berman 1991). Let us assume that the same happens in the present case. The presupposition is that there is a sum individual *z* such that for all atoms *k* this individual consists of, there is a Berliner *m* such that *k* kissed *m*. The C-variable gets resolved to the corresponding predicate $\lambda x.\ \forall k[k\in Atom(x) \rightarrow \exists m\ [Berliner(m) \wedge kiss(m)(k)]]$. Once this is done, the presupposition becomes redundant and we get (30) as the denotation of (27). After applying the same strategy to the second conjunct of (24), which is repeated below as (31a), we get (31b). The objects denoted by the two (overtly) fronted and thus topical *wh*-terms in the two conjuncts are underlined. They differ in their denotations: in conjunct 1 we have the maximal sum individual consisting of people who kissed a Berliner, and in conjunct 2, the maximal sum individual consisting of people who kissed a Londoner.

(30) Who kissed which Berliner?
$\lambda f_{<e,e>}.\ \forall y[y\in \text{Atom}(\underline{\sigma\{x:\ \text{person}(x) \wedge \forall k[k\in \text{Atom}(x) \rightarrow \exists m\ [\text{Berliner}(m)}$
$\underline{\wedge\ \text{kiss}(m)(k)]]\}}) \rightarrow \text{kiss}(f(y))(y) \wedge \text{Berliner}(f(y))]$

(31) a. Who (kissed) which Londoner?
b. $\lambda f_{<e,e>}.\ \forall y[y\in \text{Atom}(\underline{\sigma\{x:\ \text{person}(x) \wedge \forall k[k\in \text{Atom}(x) \rightarrow \exists m\ [\text{Londoner}(m)}$
$\underline{\wedge\ \text{kiss}(m)(k)]]\}}) \rightarrow \text{kiss}(f(y))(y) \wedge \text{Londoner}(f(y))]$

The *wh*-terms can thus function as contrastive aboutness topics. The crucial step that made this possible is the shift via the σ-operator: σ comes with a C-variable that gets resolved to the predicate(s) responsible for the semantic difference between the two *wh*-terms, where the respective predicate is part of the presupposition coming with the operator in $C^{0.}$

As observed in the introduction, only the first contrast pair can be surface-identical. Here is a minimal variant of (24), where the second contrast pair is surface-identical.

(32) *Which Berliner kissed who and which Londoner who?

In this case the *which*-phrases are in topic position and thus get shifted via the σ-operator, while the *wh*-pronouns retain their original denotation as predicates. We thus get (33a, b) as the denotations of the two conjuncts:

(33) a. $\lambda f_{<e,e>}.\ \forall y[y \in Atom(\sigma\{x: Berliner(x) \wedge \forall k[k \in Atom(x) \rightarrow \exists m\ [person(m) \wedge kiss(m)(k)]]\}) \rightarrow kiss(f(y))(y) \wedge \underline{person(f(y))}]$

b. $\lambda f_{<e,e>}.\ \forall y[y \in Atom(\sigma\{x: Londoner(x) \wedge \forall k[k \in Atom(x) \rightarrow \exists m\ [person(m) \wedge kiss(m)(k)]]\}) \rightarrow kiss(f(y))(y) \wedge \underline{person(f(y))}]$

(33) shows that the two phonogically identical *wh*-terms are identical at the level of semantic interpretation, too: they both denote the underlined objects. Therefore, the in-situ *wh*-items cannot be contrasted. Being foci, not topics, there is no way for them to receive a non-identical interpretation. Consequently, (32) is ungrammatical.

3.3 Open questions

There are some examples that are problematic for our account. For instance (34) is well-formed even though not only the first (and thus topical), but also the second pair of *wh*-terms is surface-identical. In our account, they are interpreted as shown in (35), which shows that there is no contrast for the second contrast pair.

(34) /WER hat /WEN am /MONtag geküsst und /WER /WEN am /DIENStag?
who has whom on Monday kissed and who whom on Tuesday
'Who kissed whom on Monday and who whom on Tuesday?'

(35) a. $\lambda f_{<e,e>}.\ \forall y[y \in Atom(\sigma\{x: person(x) \wedge \forall k[k \in Atom(x) \rightarrow \exists m\ [person(m) \wedge kiss\_on\_Monday\ (m)(k)]]\}) \rightarrow kiss\_on\_Monday(f(y))(y) \wedge \underline{person(f(y))}]$

b. $\lambda f_{<e,e>}.\ \forall y[y \in Atom(\sigma\{x: person(x) \wedge \forall k[k \in Atom(x) \rightarrow \exists m\ [person(m) \wedge kiss\_on\_Tuesday\ (m)(k)]]\}) \rightarrow kiss\_on\_Tuesday(f(y))(y) \wedge \underline{person(f(y))}]$

One possible explanation is that the object *wh*-terms in (35) are neither topics nor foci (rather, the temporal PPs are the respective foci). Therefore, their identity does not matter. But then, it should be possible to elide them, which is not borne out by the facts:

(36) */WER hat /WEN am /MONtag geküsst und WER _ am /DIENStag?
'Who kissed whom on Monday and who _ on Tuesday?'

We tentatively assume that elision is impossible here because the range of the respective function needs to be provided. Interestingly, a variant of (34) given in (37a), where the order of object *wh*-term and PP has been switched, is ungrammatical. (37b) shows that this word order is available in simple clauses, i.e. the culprit is the gapping construction:

(37) a. */WER hat am /MONtag /WEN geküsst und /WER am /DIENStag /WEN?
b. WER hat am MONtag WEN geKÜSST?

At first sight, gapping sentences involving *which*-phrases seem to behave the same:

(38) a. /WER hat /WELche Kugel in die /RECHte Ecke eingelocht
Who has which ball in the right corner potted
und /WER /WELche Kugel in die /LINke (Ecke)?
and who which ball in the left corner
'Who potted which ball in the right corner and who which ball in the left one?'

b. */WER hat die /ROte Kugel in /WELche Ecke eingelocht
Who has the red ball in which corner potted
und /WER die /GRÜne Kugel in /WELche Ecke?
and who the green ball in which corner?'
'Who potted the red ball in which corner and who the green ball in which corner?'

Interestingly, (38b) improves considerably if the second *which*- phrase is deaccented:

(39) ?/WER hat die /ROte Kugel in welche Ecke eingelocht
und /wer die /GRÜne Kugel in welche Ecke?

For the *wer*-case, however, deaccenting leads to a different interpretation: deaccented *wh*-pronouns can only be interpreted as unspecific indefinites in German:

(40) */WER hat am /MONtag wen geküsst und /WER am /DIENStag wen?
who has on Monday someone kissed and who on Tuesday s.o.
'Who kissed someone on Monday and who someone on Tuesday?'

If we assume that topics cannot be clause-final (which would need closer scrutiny), we could say that the second *wh*-phrase, if it occurs earlier in the clause, can be interpreted as a (subordinated) topic. Adopting this analysis would force us to assume a second topic position below C, which is dependent on the topic in Spec,CP. Furthermore, the operator in C must get adapted, i.e. it must take two individuals as arguments.

4 Conclusion

In this paper we argued that both indefinites and *wh*-phrases can be contrasted under surface identity if they occur in clause initial position, where they can be interpreted as aboutness topics. If they are to function as aboutness topics, they have to be shifted to the type of individuals. In the case of indefinites, which are generalized quantifiers, a minimal witness set has to be created. Since these witness sets can be different even if the quantifier is the same, we have two different individuals, which accordingly can be contrasted. In the case of *wh*-terms, which we assume to denote sets, a σ-operator can be applied to the respective set directly. Distinctness in this case comes about via the

resolution of the C-variable coming with the σ-operator to different predicates on the basis of presuppositions coming with the operator in C^0.

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Subjunctive Conditionals *

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1 Introduction

In Ippolito (2002) and subsequent work[1], I discussed the fact that within the domain of subjunctive conditionals (SC) there seem to be morphological and felicity differences. To illustrate this point, consider the following pair. (1-a) is a *simple past SC*; (1-b) is a *past perfect SC*.

(1) a. If John played the last game tomorrow, his team would win.
b. If John had played the last game tomorrow, his team would have won.

Both subjunctive conditionals talk about the future but they show difference tense morphology: unlike (1-a) which shows a single layer of past in both the antecedent and the consequent clauses (*played* and *would*), (1-b) shows two layers of past in both clauses (*had played* and *would have*).[2] Interestingly, these two SCs have different felicity conditions, as illustrated in (2).[3]

(2) John's team played the last game yesterday. The weather was terrible and they lost. Tomorrow the weather is expected to be beautiful.
a. #If they played the last game tomorrow instead, they would win.
b. If they had played the last game tomorrow instead, they would have won.

Intuitively, if an event e has already happened we can counterfactually talk about it happening at some future time only by using the past perfect future SC.

*I would like to thank Kai von Fintel for helpful comments and the audience and organizers of *Sinn und Bedeutung 12* for comments and helpful discussion.

[1]Ippolito (2003, 2006).

[2]I take it that the auxiliary *have* here instantiates a second layer of past.

[3]This contrast is also central to Ogihara (2002). For a critical review of his proposal, see Ippolito (2003). Dudman (1983) also discusses past perfect future SCs.

Grønn, Atle (ed.): *Proceedings of SuB12*, Oslo: ILOS 2008 (ISBN 978-82-92800-00-3), 256–270.

In this paper I will present an analysis of subjunctive conditionals that accounts for their semantic and pragmatic properties. The central claim is that these properties follow from the temporal structure that embeds the "bare" modal clause, and that, despite the name, being a "subjunctive conditional" (in English) means to be a bare conditional embedded under a temporal operator. Different temporal structures can embed the same modal clause, giving rise to subjunctive conditionals that have different meanings and felicity conditions, as well as different morphological forms.

2 Some facts about subjunctive conditionals

The facts about subjunctive conditionals are more complex than what I laid down in the introduction. First, if the eventuality (event or state) described in the antecedent has already happened in the past, a simple past SC cannot be used to counterfactually be talking about that event happening in the future. This point is illustrated in (3-a)-(4-a), where the *instead*-test is used to force the counterfactual reading of the past eventuality.

(3) John was sick yesterday. Now he is well, but he missed his chance to watch the final ball game. That was very unfortunate.
   a. #If only he were sick tomorrow instead, he would be happier.
   b. If only he had been sick tomorrow instead, he would have been happier.

(4) I called John yesterday to wish him a happy birthday, but it was the wrong day. His birthday is tomorrow and he got really upset. I am mortified.
   a. #If only I called him tomorrow instead, he would be happy.
   b. If only I had called him tomorrow instead, he would have been happy.

Second, if the eventuality has not already happened, the antecedent can be counterfactual.

(5) a. John is not in love with Mary. If he were, he would ask her to marry him.
   b. John is not sick now and he will not miss the final ball game. If he did, he would be devasted.

Third, even if the eventuality described in the antecedent is counterfactual, presuppositions in the antecedent (if any) cannot be.[4] Take Musan's existence presupposition (Musan (1997)): according to Musan, most predicates presuppose that their subject is in existence at the time of predication: for example, that John loves Mary now presupposes that John is alive now; similarly, that John wrote a book (at some past time) presupposes that he was alive at the time of writing. In (6)-(7), the presupposition that John is alive now is not true.

[4]See Ippolito (2006) and references cited there.

(6) John died last year. #If he were in love with Mary (now), he would ask her to marry him.

(7) John died last year. #If he finished his manuscript this year, it would be accepted for publication.

Fourth, if the antecedent of a simple past SCs has no presuppositions, the simple past SC is always felicitous.

(8) Pigs with wings do not exist. If they did, they could fly.

Fifth, when one of the presuppositions in the antecedent is not met, a past perfect SC is required.

(9) John died last year. If he had completed his manuscript this year, it would have been accepted for publication.

Sixth, past perfect SCs that are not about the past seem to be obligatorily counterfactual.[5]

(10) It's very unlikely that John will play the last game tomorrow, even though still possible.
#If he had played the last game tomorrow, he would have won.

2.1 More on presuppositions

One of the generalizations made above is that when one of the presuppositions in the antecedent is not met, a simple past SC is not felicitous and a past perfect SC is required. The presupposition we used above to illustrate this generalization was Musan's existence presupposition (cf. (9)). In this section, I will consider more types of presupposition triggers to check whether the generalization given above holds. We will see that for change of state verbs, factive verbs, and cleft-sentences, the generalization does indeed hold. Let us begin with the verb *to quit*, a change-of-state verb normally considered to be a presupposition trigger. For example, both *John will quit smoking tomorrow* and *John will not quit smoking tomorrow* presuppose that John will smoke tomorrow. The judgments reported in the following pair supports our generalization: in a context entailing that Lucy is no longer a smoker, a past perfect SC is felicitous, unlike a simple past SC.[6]

[5]For lack of space I cannot elaborate on this property of non-past past perfect SCs in this paper. For possible analyses, see Ippolito (2003, 2006). In this paper, I will just assume that this observation is true.

[6]The example in (11) is slightly changed from Ippolito (2003).

(11) Lucy was a heavy smoker but she quit smoking ten years ago, after she had pneumonia. A new law was passed last week requiring people who have quit smoking to take a new medical test (the law is not retroactive). This test detects long-term problems in ex-smokers but is very painful. Thinking about Lucy, I say:

a. #Good for her. If she quit smoking tomorrow instead, she would have to take this new painful test.

b. Good for her. If she had quit smoking tomorrow instead, she would have had to take this painful test.

For reasons of space I cannot discuss the nature of the presupposition triggered by *quit*, but the anaphoric nature of the presupposition triggered by change-of-state verbs has been defended in Heim (1990), Kripke (1990).[7] Suppose then that, in a context with a salient smoking by Lucy, the presupposition triggered by *quit* is that the salient smoking by Lucy will continue until tomorrow. This presupposition is not satisfied by the context of utterance in (11) and, according to the generalization under discussion, the simple past SC—unlike the past perfect SC—is infelicitous.

Similarly for factive verbs. Consider the pair below.

(12) John and Sue were supposed to marry this morning, but he broke off the engagement when he found out that she had cheated on him. Since he's very conservative, I am glad he found out in time:

a. #if in the future he regreted marrying her, he would never ask for a divorce.

b. if in the future he had regreted marrying her, he would have never asked for a divorce.

The presupposition triggered in the antecedent is that John married Sue, which is not true in the context of utterance. The generalization then correctly predicts that the simple past SC, unlike the past perfect SC, should be infelicitous.

Finally, consider the cleft-construction in (13).

(13) Tomorrow's baseball game has been cancelled due to the weather. Our team has three pitchers. John, the good pitcher, was not going to play tomorrow since he injured himself last week. Bill and Fred are terrible pitchers but, since John is injured, one of them was certain to play. You seem upset that tomorrow's game has been cancelled, but I am actually relieved.

a. #Why are you upset? We were going to lose the game! If it were Bill who pitched tomorrow, we certainly would lose, and if it were Fred who pitched tomorrow, it would be just as bad.

b. Why are you upset? We were going to lose the game! if it had been Bill who pitched tomorrow, we would have certainly lost, and if it had been Fred who pitched tomorrow, it would have been just as bad.

[7] In Ippolito (2008), I discuss this question further and how it bears on the analysis of SCs.

The presupposition triggered by the cleft-construction is that someone will pitch tomorrow, which in not satisfied in the context described above. According to our generalization, the simple past SC should not be felicitous, which is indeed correct.

What about cases like (2), (3), and (4), where the infelicity of the simple past SC seems to be due to the fact that the eventuality supposed to happened in the past actually already happened? For reasons of space, I cannot explore this important issue in detail here and the following remarks must be sketchy, but I refer the reader to Ippolito (2008) for a lengthier discussion. I am going to tentatively suggest that, along the lines of Musan's existence presupposition, (most) predicates carry a "novelty" presupposition, that is that the eventuality described by the predicate has not occurred yet at the time of predication. This presupposition together with the fact that the eventuality described by the predicate can be interpreted referentially (i.e. as referring to a contextually salient eventuality of the relevant type) gives rise to infelicity in the examples in question: the reason why the simple past SCs in these examples are infelicitous is because in all these cases *the* eventuality in question is known to have already happened in the past and therefore the "novelty" presupposition (that it will not have happened before tomorrow) is not met.[8]

I take these judgments to be telling us that the generalization I proposed above is correct for at least Musan's existence presupposition, the change-of-state presuppositions, factive presuppositions, and the presupposition triggered by the cleft-construction (and maybe the "novelty" presupposition, if it turns out to be correct). (There are some well-known cases of presuppositions that do not seem at first to behave according to our generalization in that when these presuppositions are not satisfied by the context of utterance, a past perfect SC is infelicitous as well. This is the case for the presupposition triggered by the definite article[9] and the presupposition triggered by additive particle such as *too* and *again*[10]. In Ippolito (2003) I discussed why I don't think *too* and *again* should be viewed as counterexamples. As for the definite article, in Ippolito (2008) I defend the view that this too should not be viewed as a counterexample to the current proposal.)

3 The role of tense

The proposal I would like to defend here is that conditionals sentences should be analyzed as "bare" conditional structures embedded under a temporal operator. By "bare conditional structure" I mean the structure formed by the modal operator, its restriction and its nuclear scope. The semantic differences between simple past SCs and (future) past perfect SCs follow from the fact that in different types of conditionals, the bare conditional is embedded under a different temporal structure. The goal of the next sections is to show that the facts we observed above follow from this hypothesis.

[8] A discussion of the "novelty" presupposition and an exploration of its consequences must await another occasion.

[9] Arregui (2004)

[10] Ippolito (2003)

What are the possible temporal structures embedding bare conditionals? Suppose with Iatridou (2000) and others, that the distinctive feature of SCs is the past tense: in simple past SCs a past tense occurs which cannot be interpreted within the antecedent or the consequent clauses, and in past perfect SCs a past perfect occurs that might not be interpreted in either the antecedent or the consequent clauses.[11] Let us suppose that the marking of SCs with the past tense is not a quirk of English morphology but the surface realization of the presence of a real tense operator embedding the bare conditional structure. The preliminary proposal is the following: "structural" simple past SCs are bare conditionals embedded under a simple past; "structural" past perfect SCs are bare conditionals embedded under a past perfect.[12,13]

3.1 A bare conditional

A bare conditional structure is a structure of the form *Modal* φ, ψ. Following Kratzer (1981, 1991), among others, I take the modal operator to be an operator quantifying over possible worlds; φ, the restriction of the operator, is provided by *if*-clause; ψ, the nuclear scope of the operator, is provided by the consequent. The two parameters for the interpretation of the modal – the conversational background and the ordering source, in Kratzer's terminology – are the historical accessibility function H and the similarity function $MAX_{\leq}$. H is such that, given a world w, a time t, and a proposition φ, it will select the worlds w' that share the same history as w up to t and where φ is true.[14] A more formal definition is given in (14-a). The similarity function $MAX_{\leq}$ is such that given the set of accessible worlds A and a world w, the similarity function will select the worlds w' in A that are maximally similar to w.[15] Its definition is given in (14-b).

(14) a. $\mathrm{H}_{w,t}(p) = \{w'\colon w' \in p \text{ and } w' \text{ shares the same history as } w \text{ up to } t\}$
b. $\mathrm{MAX}_{\leq,w}(A) = \{w' : w' \in A \wedge \neg\exists w'' : w'' \in A \wedge w'' \leq_w w'\}$

Given these definitions, the meaning of the bare modal structure *Modal* φ, ψ will be as follows.

(15) $[\![[\textbf{Modal } \varphi]\ \psi]\!]^{w_c,t} = 1$ if $\forall w' \in MAX_{\leq,w_c}(HIST_{w_c,t}(\varphi)) : w' \in \psi$

With these pieces in place, let us look at the structure of a simple past SC.

[11] This can be seen in past perfect SCs where adverbs that can't normally occur with a past perfect can in fact cooccur with the past perfect in the antecedent; this point is clearly even stronger in the case of future past perfect SCs of the type we have been discussing in this paper.

[12] I used the word "structural" because, as we will see later, what looks like a past perfect SC might structurally be a conditional embedded under a simple past, that is, what I called a structural simple past SC.

[13] An extensive discussion of indicative conditionals and their relation to simple past SCs must await another occasion.

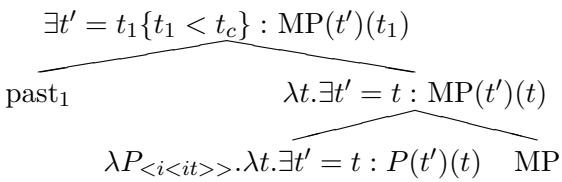
[14] Thomason and Gupta (1980), Condoravdi (2001), Ippolito (2002, 2006), among others.

[15] The definition in (14-b) follows von Fintel (2001).

3.2 A simple past SC

A simple past SC is a bare conditional embedded under a simple past.[16] In Reichenbach (1947)'s theory of tense, each tense is complex in that it expresses two relations: a relation between the event time (t_e) and the reference time (t_r) and a relation between the reference time and the speech time (t_c). In this picture, the relation between the event time and the speech time is indirect and mediated by the reference time. For example, the present tense will say that t_e coincides with t_r and t_r coincides with t_c ($t_e = t_r = t_c$); the simple past will say that t_e coincides with t_r but t_r precedes t_c ($t_e = t_r < t_c$); and the past perfect will say that t_e precedes t_r and t_r precedes t_c ($t_e < t_r < t_c$). I am going to recast Reichenbach's view in a system where each temporal relation (t_e-t_r, and t_r-t_c) is realized by a distinct temporal operator expressing either an "overlap" relation or a "precedence" relation. For example, the syntactic realization of a simple past will be as follows.[17] The material in curly brackets is the past presupposition carried by the time variable t_1. MP is the embedded bare conditional phrase.

(16)



Before I spell out the contribution of tense to the modal sentence, let me introduce my proposal about the meaning of the modal operator.

(17) $[\![\mathbf{Modal}_\forall]\!]^{c,g} = \lambda p.\lambda q.\lambda t.\lambda t'\{$ there is a w s.t. it is a historical issue in w at t' whether $p.\}$ For all p-worlds w' historically accessible from w_c at t and overall maximally similar to w_c, q is true in w'.

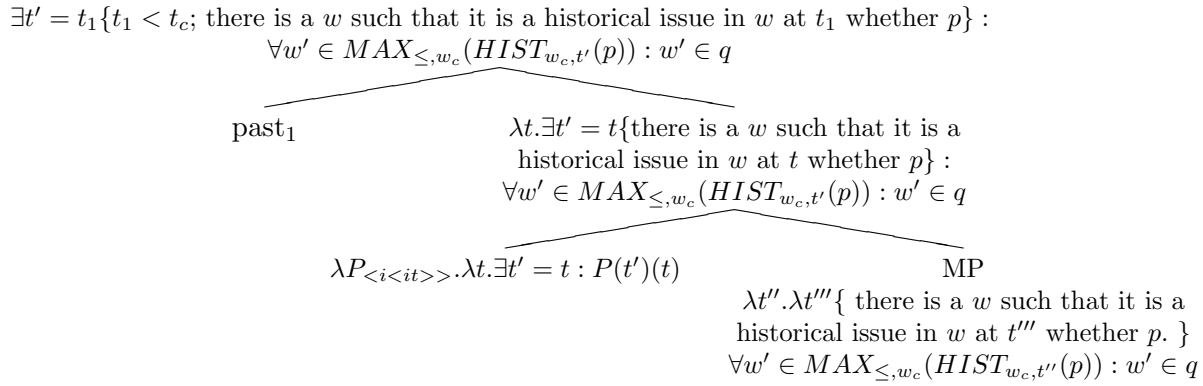
One obvious way in which the tense operator affects the interpretation of the modal sentence it immediately embeds is by manipulating the time argument of H. In particular, the event time (the existentially quantified time variable) becomes the time-argument of H. This is in line with our definition of H in (14-a). But there is more. As (17) shows, the modal operator triggers a presupposition as well, that is the presupposition that there is a world such that in that world at time t' it is a historical issue whether the antecedent proposition p is true. Let us call this presupposition the "historical issue presupposition" (HIP). If HIP is satisfied, then the sentence is true if all p-worlds historically accessible from the actual world at t and (overall) maximally similar to the actual world, are q-worlds. There are two questions that arise: (a) we have said that the time-argument of H, t, is going to be manipulated by the tense operator above the modal, but what is

[16] Unlike Ippolito (2006) where the bare conditional was embedded under a present perfect. See that reference for more details.

[17] For lack of space, I am leaving open the question of what the right labels for these two temporal heads are. Moreover, for convenience, I assume that while the lower temporal component is an operator quantifying over times, the higher temporal element is a time variable carrying a past presupposition (see Heim (1994) for the presuppositional analysis of tense I am presupposing here).

the value of t' going to be? (b) what is the definition of "historical issue"? Let us begin with question (a). The value of t' is also going to be determined by the tense operator immediately c-commanding the modal structure, as shown in (18).[18]

(18)



The result of combining the lower tense operator with the denotation of the modal phrase is that, while the time relevant to H will be the event time, the time relevant to HIP will be the reference time. Because the event time and the reference time coincide in (18), both the time-argument of H and the time relevant for HIP are going to coincide. Turning now to question (b), let us define "historical issue" as follows.

(19) **Historical Issue**
For any proposition p, world w and time t, p is a historical issue in w at t just in case:
(i) w is historically as close to w_c as allowed by the fact that the set of worlds accessible from w at t (call this set A) must include both p-worlds and $\neg p$-worlds;
(ii) all the worlds $w' \in A$ maximally similar to w_c are worlds where ps(p) are true (ps(p) = presuppositions in p).

Could w be the actual world w_c? It could, so if p is foreclosed in w_c, t must be a time immediately before the time when p got foreclosed in w_c. I am now in a position to give the full truth-conditions for *If John were in love with Mary, he would ask her to marry him.*

(20) Where (i) $g(1) < t_c$ and (ii) there is a world w such that it was a historical issue in w at $g(1)$ whether John is in love with Mary (now):
$[\![$**[PAST$_1$[T$_2$[Modal$_{\forall,t_2}$ [John is in love with Mary] [he will ask her to marry him]]]]**$]\!]^{c,g} = 1$ if $\exists t_2 = g(1)$ s.t. $\forall w'$ s.t. John is in love with Mary in w' and $w' \in H_{w_c,t_2}$ and $\neg\exists w''$ s.t. John is in love with Mary in w'' and $w'' \in H_{w_c,t_2}$ and $w'' <_{w_c} w'$, he will ask her to marry him in w'.

[18] This requires the type of this operator to be $<< i < it >>< it >>$ so that it can combine with a node of type $< i < it >>$.

Because in a simple past $t_e = t_r$, the time relevant for HIP and the time-argument of H are going to coincide and precede t_c.

3.3 Explaining felicitous and infelicitous simple past SCs

Reconsider the contrast below.

(21) a. John is not in love with Mary. If he were, she would be happy.
b. John is dead. #If he were in love with Mary, she would be happy.

The truth-conditions for the simple past SC were given at the end of the previous section. Recall that the conditional in question is felicitous if HIP is satisfied. Let's begin with (21-a) and why it is felicitous. Firstly, in order for HIP to be satisfied there must be a world such that at the reference time t_r p and $\neg p$ are accessible, where t_r is a time before t_c. Suppose w is w_c. In this case, t_r must be a time immediately before the time when the possibility that John would be in love with Mary now got foreclosed. The set of worlds accessible at this time will contain both worlds where he is in love with Mary now as well as worlds where he isn't. Secondly, in order for HIP to be satisfied it must be that p's presuppositions (if any) are true in all worlds in this set maximally similar to w_c. In (21-a), p's presupposition is that John is alive now. Since w_c in the closest world to itself in the set of worlds historically accessible from w_c at t_r, p's presupposition is required to be true in w_c. Since John is indeed alive now in w_c, HIP is satisfied. Furthermore, there are antecedent-worlds accessible from w_c at t_r (technically, t_e is H's time-argument, but here $t_e = t_r$), and the conditional is therefore not vacuously true. The simple past SC in (21-a) is felicitous.

What goes wrong in (21-b)? The truth-conditions are the same truth-conditions we gave for (21-a). We need to check whether HIP is satisfied. Suppose $w = w_c$. If so, t_r (the time relevant for HIP) must be the time immediately before the time when the possibility that John would be in love with Mary now got foreclosed, that is a time immediately before John died. Since w_c is the closest world to itself in the set of worlds historically accessible from w_c at t_r, HIP is satisfied iff the presupposition that John is alive now is true in w_c. This presupposition is not satisfied in w_c since in w_c John is dead. Therefore, HIP is not satisfied by w_c. Suppose $w \neq w_c$. If $w \neq w_c$, w would have to be a world which diverged from w_c immediately before the time when John died: t_r would then be some time after the divergence (but before t_c) such that in the worlds historically accessible from w at t_r maximally similar to w_c John is alive now.[19] However, this will not work because this later reference time t_r is also required to be the time-argument of

[19] An important issue that for reasons of space I cannot expand on is what counts as maximally similar to w_c. Briefly, let me say here that I follow Lewis (Lewis (1979)) in taking worlds that diverged once and then followed their own course of events to be more similar to w_c than worlds that diverged once and where convergence was later restaured. This is an intricate issue, though, and central to the present discussion, and I regret that I cannot pursue this discussion further. For lack of space, here I will assume that among the worlds which diverged from w_c just before John died, the ones where John is still alive now are worlds more similar to w_c than worlds where he died sometime between the actual time of death in w_c and now.

H in the truth-conditions (again, this is because $t_e = t_r$), but since it follows the time when the possibility that John would be in love with Mary now was foreclosed, there are no worlds historically accessible at this time from w_c where John is in love with Mary now. The conditional turns out to be vacuously true and therefore, infelicitous.

To sum up our discussion of (21-b), if w is w_c and if we take the time relevant for HIP to be the time immediately before John died, then HIP won't be satisfied. If w is some other world which diverged from the actual world immediately before John died, thus making the time relevant for HIP some time after the divergence (even though still before t_c), HIP will be satisfied but the conditional will be vacuously true because, this time being required to be the time parameter of H, there are no longer any antecedent-worlds histrically accessible from w_c at that time. In conclusion, either way the conditional is infelicitous.

3.4 Past perfect SCs

The observation we made at the begining of this paper was that, in the examples we considered, when a simple past SC was infelicitous, a past perfect SC was felicitous. Why? Take (22).

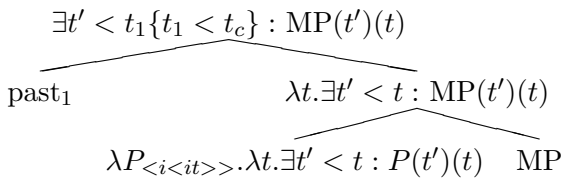
(22) John is dead. Bill, the man Mary is engaged with, has shown no inclination to marriage whatsoever. John's plans for the future, on the other hand, had always included marriage.

a. #Unlike Bill, if John were in love with Mary now, he would ask her to marry him.

b. Unlike Bill, if John had been in love with Mary now, he would have asked her to marry him.

The schematic structure of a past perfect SC is given below. Just like the simple past, the past perfect is realized by two distinct heads. In the structure below, MP is the bare conditional structure with the same meaning we gave in (18).

(23)



As in the case of simple past SCs, the lower tense head in (23) will provide both the time relevant for HIP (t_r in Reichenbachian terms) and the time-argument of H (t_e). Unlike simple past SCs, though, here these two times do not coincide: the time-argument for H precedes the time relevant for HIP. The truth-conditions are given below.

(24) Where (i) $g(1) < t_c$ and (ii) there is a world w such that it was a historical issue in w at $g(1)$ whether John is in love with Mary (now):

> $[\![$**past**$_1$ [**T**$_2$ [**Modal** [**John is in love with Mary now**] [**he will ask her to marry him**]]]$]\!]^{w_c}$ is true if $\exists t_2 < g(1)$ s.t. $\forall w'$ s.t. John is in love with Mary now in w' and $w' \in H_{w_c,t_2}$ and w' is $\neg\exists w''$ s.t. John is in love with Mary in w'' and $w'' \in H_{w_c,t_2}$ and $w'' <_{w_c} w'$, he will ask her to marry him in w'.

We need to check whether HIP is satisfied. Suppose w is w_c. Then, t_r (the time relevant for HIP) must be a past time immediately before the time when John died. Since w_c is among the set of historically accessible worlds from w_c at t_r, and is the closest to itself, HIP will be satisfied only if John is alive now in w_c. Since John isn't alive now in w_c, HIP is not satisfied for $w = w_c$.

Just like we did for simple past SCs, suppose $w \neq w_c$. This must be a world which diverged from w_c immediately before John died and, therefore, t_r must follow the time of the divergence (but still be before t_c). HIP will be satisfied because worlds historically accessible from w at t_r maximally similar to w_c are going to be worlds where John is alive now (these are going to be worlds where John didn't die when he did or anytime between that time and now—see footnote 19). Now, if t_r were the time-argument of H in (24) then we would have a problem in that there are no longer antecedent-worlds accessible from w_c at t_r. However, because this is a past perfect SC, the time-argument of H isn't t_r but a time before t_r. In other words, for the sentence not to be vacuously true there must be a time before t_r such that antecedent-worlds are accessible at that time. Is there such a time? Yes, it is the time immediately before the time of the divergence, i.e. the time immediately before John died. HIP is then satisfied and the conditional is not vacuously true.

Let me sum up our discussion of past perfect SCs. If $w = w_c$ and t_r is the time immediately before the time when John died, HIP will not be satisfied. If w is some other world which diverged from w_c just before John died, and t_r is therefore a past time later that the divergence time, HIP will be satisfied. Choosing this later time for the satisfaction of HIP will not cause the conditional to be vacuously true because the time argument of H is a time before t_r and this is indeed the time of the divergence. The two layers of past in the past perfect allow the time-argument of H to precede the time relevant for HIP and therefore, allow the conditional to be felicitous when the presuppositions in its antecedent aren't true in the actual world.

4 The temporal interpretation of antecedent and consequent clauses

Superficially, simple past SCs and past perfect SCs differ with respect to their compatibility with different temporal adverbs: simple past SCs only seem to be compatible with non-past adverbs, whereas past perfect SCs are compatible with both past and non-past adverbs.

(25) a. If John were cooking now/*yesterday, I would not have to.

b. If John cooked tomorrow/*yesterday, I would not have to.

(26) a. If John had been cooking now, I would not have had to.
b. If John had cooked tomorrow, I would not have had to.
c. If John had cooked yesterday, I would not have had to.

In this section I will argue that the apparent generalization that simple past SCs cannot be about the past is not correct: a SC whose antecedents is about the past can have the structure of a simple past SC but it cannot look like one for morphological reasons. Consider the fact that the present tense can be used to talk about both the present and the future if the predicate is stative, but only to talk about the future if the predicate is eventive.[20] Now, as we know the same pattern holds in SCs, as shown again in (28).

(27) a. I hope John is well tomorrow/every day/right now.
b. I hope John cooks fish tomorrow/every day/*right now.

(28) a. If John were sick tomorrow/every day/right now, ...
b. If John cooked fish tomorrow/every day/*right now, ...

This tells us that (i) the antecedents of conditionals are tensed and are evaluated with respect to the speech time;[21] (ii) a present tense occurs in the non-past antecedent of a simple past SC. With respect to point (ii), the structure of non-past simple past SCs looks like (29-a): the past tense we see is interpreted above the modal (which is what makes this conditional a "subjunctive" conditional, and not an indicative one), but the tense of the antecedent is a present. However, there is a second possibility, that is that a past tense occurs within the antecedent (in addition to the one above the modal), as shown in (29-b).

(29) a. PAST [MODAL [**PRESENT** φ]^{t_c} [...]]
b. PAST [MODAL [**PAST** φ]^{t_c} [...]]

The question is then, if the structure in (29-b) is allowed, why is (30) bad?

(30) *If John cooked fish yesterday, I would not have to.

The answer is that the structure of (30) cannot be (29-b) because, the one past tense in (30) needs to be interpreted outside the antecedent proposition (since (30) is understood as a subjunctive conditional) and therefore there cannot be any past tense in the antecedent. Since the antecedents of SCs are tensed, the only available possibility is that a present tense occurs in the antecedent, which is incompatible with the past adverb and causes the sentence to be uninterpretable. Since (30) cannot realize (29-b), what

[20] Note that the possibility of interpreting the embedded present in (27) as a future is not forced by the semantics of *hope*, since this verb can also embed the past tense as in *I hope John cooked fish last night for his guests.*

[21] See Kaufmann (2005) for another proposal about the temporal interpretation in conditionals.

can? Because English can realize two layers of past within the same clause with the past perfect form, it must. Therefore, (29-b) is going to the spelled out as (31).

(31) If John had cooked fish yesterday, I would not have had to.

In conclusion, some SCs which look like past perfect SCs are simple past SCs structurally. What does this tell us about past perfect SCs in general? We know that they can occur with past, as well as present and future adverbials (cf. (26)). We know that (26-a) and (26-b) can structurally only be past perfect SCs, since neither layer of past can be interpreted in the antecedent. The situation is more complex in the case of (26-c). As we saw above, (26-c) could be the spell out of the structure in (29-b), that is (26-c) could structurally be a simple past SCs (about the past). But (26-c) could also be the spell out of a structural past perfect SC about the past.

(32) [PAST PERFECT[MODAL [**PAST** φ]^{t_c} [...]]

Because in English there is no tense form that can realize three layers of past within the same sentence, the possible structure in (32) is always going to be spelled out as (26-c), and as such will be indistinguishable from the surface form of (29-b). The structural ambiguity I am proposing may explain some of the "mixed" properties of subjunctive conditionals about the past. For example, on the one hand, just like structural past perfect SCs, these conditionals are felicitous even though the presupposition in the antecedent (if any) are not true in the actual world.

(33) John quit smoking ten years ago. If he had quit smoking only a year ago, he still wouldn't be able to win the marathon.

On the other hand, unlike structural past perfect SCs but like simple past SCs, the antecedent of a subjunctive conditional about the past doesn't have to be counterfactual.

(34) If the butler had killed Mr. Jones, we would have found precisely these marks on the floor. So, he must have killed Mr. Jones!

In the present analysis, the past perfect SCs that are obligatorily counterfactual are the structural past perfect SCs, that is modal structures embedded under a past perfect. We can see that this is true in Standard English with past perfect SCs that are about the present and the future (since in these cases we know we have structural past perfect SCs), but because of the limitation of Standard English morphology, there are no unambiguous structural past perfect SCs and therefore we cannot check whether this is the case with past perfect SCs about the past. However, other varieties of English might be more hepful in this respect. Dancygier and Sweetser (2005) discuss a kind of conditional found in some American and British colloquial dialects (previously discussed in Fillmore (1990)), where they argue that an extra auxiliary head occurs. In (35), the *a*-form is presumably this extra auxiliary head. Both examples are cited in Dancygier and Sweetser (2005).

(35) a. If I hadd-*a* known you were coming, I would-*a* stayed home.
b. If I hadn't *a*-been ill, I'd *a*-got him away all right,...

Interestingly, when writing about these examples, Dancygier and Sweetser say that "these -*a* forms seem necessarily to convey the speaker's belief that the described situation does not hold in the reality space." (Dancygier and Sweetser, 2005, pg. 63.) Or elsewhere, "we see no possible non-counterfactual interpretation for *if hadn't a-been ill*." (Dancygier and Sweetser, 2005, pg. 65.)

5 Conclusion

SCs can be devided in two kinds: structural simple past SCs and structural past perfect SCs. Both kinds share the same bare modal structure, but while in the former this structure is embedded under a simple past, in the latter it is embedded under a past perfect. We saw that what look like past perfect SCs about the present and the past are always interpreted as structurally past perfect SCs because no layer of past can be interrpeted within the antecedent without causing the sentence to be uninterpretable. However, because of the limitations of Standard English morphology, even though SCs about the past always look like past perfect SCs, they are structurally ambiguous between structural simple past SCs and structural past perfect SCs. This was argued to be able to potentially shed some light on the fact that SCs about the past show a mixed behavior with respect to their semantic and pragmatic properties.

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Evidentiality and Determination *

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Abstract

This paper investigates the semantic properties of the French determiner *quelque*. It is shown that *quelque* conveys inferential *evidentiality*, that is, it selects interpretations in which the speaker infers the proposition conveyed by the sentence that hosts the determiner. This accounts for several other properties, for instance the fact that *quelque* is *anti-specific* and does not combine freely with negation. A notable consequence of the analysis is that the free choice and positive polarity behaviour of *quelque* are reduced to its basic semantics.

1 Introduction

The French determiner *quelque*, although it is somewhat literary or formal in many of its uses in modern French[1], still attracts interest from semanticists, due to its particular combination of properties (Corblin, 2004; Culioli, 1982; Jayez and Tovena, 2002; Van de Velde, 2000). At first sight, *quelque* is an existential anti-specific indefinite, because an interpretation where the referent of the NP is identified by the speaker is precluded. In this respect, it is totally similar to *un quelconque* (Jayez and Tovena, 2002, 2006). In this paper, we show that *quelque* is an *evidential* determiner which qualifies the mode of information available to the speaker, and that anti-specificity is a side-effect of evidentiality (section 3.2). The paper is organised as follows. In section 2, we present the main properties of *quelque*. In section 3, we define the anti-specificity profile of this determiner (3.1), show how it relates to evidentiality (3.2), and how this relationship accounts for various problematic observations (3.3). In section 3.4, we clarify the similarities and differences with free-choiceness. Finally, in section 4, we address the peculiarity of the combination of *quelque* with negation and show how it follows from its semantic profile.

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[1]The situation is far from being uniform. By and large, the combination with concrete nouns in episodic sentences has disappeared, but this is not the case for other combinations. Note also that the unmarked determiner with concrete nouns in episodic sentences is *un quelconque* (Jayez and Tovena, 2002).

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2 Main properties of *quelque*

Quelque is an existential indefinite determiner and can be found in many standard contexts for the class, for instance assertive positive and negative sentences, imperative and interrogative sentences, antecedents of conditionals, etc. However, three properties distinguish *quelque* from a plain indefinite like *un* 'a'.

First, the identity of the individual referred to must not be known by the speaker, or, more generally, by any relevant agent that believes that the sentence is true.[2] (1)a is weird because one normally assumes that the speaker is able to identify the friend she met yesterday.

(1) a. ??Hier j'ai rencontré quelque amie
'Yesterday I met some friend or other'
b. Hier, Yolande a dû rencontrer quelque amie
'Yesterday, Yolanda must have met some friend or other'

Second, it was observed by Culioli (1982) that the epistemic source matters. In more general terms, we note that some inferential source must be involved in the interpretation of the sentence hosting *quelque*. So, *quelque* is infelicitous when there is clearly no inference by the relevant epistemic agent. In (2)a, the speaker, who is the default epistemic agent, depends on Yolanda's declaration, not on her own inferential capabilities. In general, *quelque* is not natural with non-inferential reportives such as *selon* NP 'according to' NP or *paraît-il* 'I hear', see (2)b. This must not be confused with a requirement of ignorance, since, in (2), the speaker may perfectly ignore who Yolanda met.

(2) a. ??Yolande m'a dit qu'elle avait rencontré quelque amie
'Yolanda told me she had met some friend or other'
b. ??D'après sa sœur, Yolande a rencontré quelque amie
'According to her sister, Yolanda met some friend or other'

However, Culioli observes that *quelque* is fine in habituals and we note that this holds in cases where there is no apparent inference, see (3).

(3) L'après-midi, elle allait habituellement voir quelque ami
'In the afternoon, she usually visited some friend or other'

Sensitivity to ignorance and inference is not found with some abstract mass nouns either. (4) is felicitous although the speaker directly witnesses Yolanda's emotional state.

(4) J'ai vu que Yolande éprouvait quelque irritation
'I saw that Yolanda felt some irritation'

[2] In what follows, we use *epistemic agent* to refer to this type of agent, the speaker by default.

Third, *quelque* has a particular profile with respect to negation (Corblin, 2004). It exhibits a 'PPI-like' behaviour (Baker, 1970; Szabolcsi, 2004) analogous to that of *some*. In particular, it is infelicitous in the immediate scope of antiadditive operators (5). Example (5) is anomalous if *quelque* has narrow scope.

(5) Yolande n'a pas dû trouver quelque fichier
'Yolanda must have not found some file'
??[neg > *quelque*] vs. [*quelque* > neg]

These properties do not seem to form a coherent set. However, we propose an analysis that shows that the behaviour of *quelque* is more homogeneous than these preliminary observations suggest.

3 Epistemic properties of *quelque*

In the previous section, we saw that *quelque* is sensitive to ignorance of and inference by the epistemic agent. This raises several questions, that we address in turn. Is there a relation between ignorance and inference? How does habituality fit into the picture? How can one account for the compatibility of *quelque* with abstract nouns?

3.1 Ignorance

Borrowing from (Jayez and Tovena, 2006), we define ignorance of an agent with respect to a description as in (6). (6) says that a ignores which individual satisfies the description Δ if and only if no individual satisfies Δ in all the epistemic alternatives she entertains.[3]

(6) Let a be an agent and $\Delta(x)$ a set of formulas in the free variable x. Note $M, d \models \Delta(x)$ the fact that $M, g^x_d \models \Delta(x)$ for some g. At w, a ignores which individual satisfies $\Delta(x)$ whenever there is no d such that, for all the epistemic alternatives w_i of a in w, $M_{w_i}, d \models \Delta(x)$.

Quelque requires that the epistemic agent ignore which individual satisfies the description provided by the sentence. We use the label *C-ignorance* to refer to this constraint in the sequel. For instance, in (1)a, the epistemic agent should ignore which individual satisfies the property $\lambda x.$*friend*(x) & *met-yest.*(x). This is implausible since the value of x is supposed to be a friend of the speaker, who is the default epistemic agent. More precisely, for an epistemic agent a with a set of alternatives W, we have (7).

[3] As shown in Farkas (2002) and Jayez and Tovena (2006), a correct representation of ignorance is actually more complex because it has to take into account scope problems. We disregard this additional source of complexity, since it is tangential to the main issues we address here.

(7) **C-ignorance** For a (modal) tripartite form $\Phi([Quelque]_x[\mathrm{R}][\mathrm{S}])$, where Φ is a possibly null/ complex modal operator, an interpretation is appropriate only if it does not entail: $\exists x(\forall w \in W(w \models \Phi(R(x)\ \&\ S(x))))$.

3.2 Where evidentiality comes in

The status of evidentiality is complex. A well-known open issue is its relation to modality. Aikhenvald (2005) equates evidentiality with linguistic marking of information source. She claims that, in itself, evidentiality "does not imply any reference to validity or reliability of knowledge or information" (p. 5). We consider that *quelque* pertains to evidentiality because it qualifies the information source. By using *quelque*, the speaker signals that she does not use perceptual or hearsay evidence containing the proposition expressed by the sentence. This is compatible with the speaker using perceptual or hearsay evidence to feed an otherwise inferential process through which she produces the proposition. Moreover, *quelque* does not commit the speaker to a particular modal force, as shown by (8).

(8) a. Yolande a peut-être rencontré quelque ami
'Perhaps Yolanda met some friend or other'
b. Yolande a nécessairement rencontré quelque ami
'Yolanda necessarily met some friend or other'

Accordingly, we propose that *quelque* marks *inferential evidentiality*, i.e. the fact that the source of information is an inferential process by the speaker. Since modal adverbs and epistemic verbs convey inferential evidentiality, they are compatible with *quelque*. *Quelque* does not require an explicit independent marking of evidentiality. Rather, it is licensed by *interpretations*. This accounts for the fact that it may be found in simple declarative sentences whenever an inferential evidential interpretation is available, see (9).

(9) Il y a de la lumière dans le bureau; quelque idiot a oublié d'éteindre
'The light is on in the office; some idiot has forgotten to switch it off'

The representation of evidentiality is a difficult matter. Following Aikhenvald and Westmoreland (1995), we do not base evidentiality on modal status. In this case, one can consider that assertive sentences correspond to pairs $\langle s, \phi\rangle$, where ϕ is the main content and s is the source of evidence (hearsay, inference, etc.). Is it possible to order sources? One might define the strictest source of evidence as in (10). When an agent, using the maximal source σ, asserts that ϕ, either the other sources do not suggest the contrary or the agent prefers the strictest source in any case.

(10) σ is a unique maximal source of evidence $=_{\mathrm{def}}$ for every agent a and every source $s \neq \sigma$, if $\langle \sigma, \phi\rangle_a$, then either (i) $\neg\langle s, \neg\phi\rangle_a$ or (ii), if $\langle s, \neg\phi\rangle_a$, then a believes that ϕ.

There are at least two problems with this type of approach. First, the existence of a unique maximal source of evidence is not guaranteed. For some propositions, there may be several competing sources with equal strength. Second, the very term of 'source' is unclear since it covers the type of evidence and the type of processing. For instance, what 'source' does an inferential process applied to some visual evidence constitute?

We propose to distinguish sources proper and their treatment. In certain cases, the treatment determines the type of source. E.g. visual processing can only apply to visual cues. Inferential processing may apply to the result of other types of processing. E.g., an agent can infer a proposition from what she 'sees', i.e. from the result of applying visual processing to visual cues. For *quelque*, what counts is the processing. More precisely, *quelque* requires that the corresponding existential proposition be reached through inferential processing.

(11) **C-inf** A form $[quelque]_x$ $[R]$ $[S]$ is appropriate only under interpretations where the epistemic agent *infers* that $[\exists]_x$ $[R]$ $[S]$.

In most cases, inferential processing leads to conclusions that are weaker than those reached through perceptual processing, which accounts for the contrast in (12).

(12) a. Yolande a dû$_{\text{epist}}$ ouvrir la porte. En fait, je me souviens, je l'ai vue
'Yolanda must$_{\text{epist}}$ have opened the door. Actually, I remember I saw her'
b. ??J'ai vu Yolande ouvrir la porte. En fait, elle a dû$_{\text{epist}}$ l'ouvrir
'I saw Yolanda open the door. Actually, she must$_{\text{epist}}$ have opened it'

But this is not necessarily so. In (13), the mathematical conclusion is inescapable. Yet, *quelque* is licensed by the inferential origin of the proposition that there exists some extremum.

(13) Puisque la dérivée s'annule et change de signe sur I, elle a nécessairement quelque extremum
'Since the derivative has a zero and changes signs over I, it necessarily has some extremum'

Are ignorance and evidentiality, as expressed in *C-ignorance* (7) and *C-inf* (11), related in some way? A way of reformulating the question is: does the fact that a situation conforms to *C-ignorance* entail the fact that it conforms to *C-inf*, or the reverse, or is there no entailment? If a ignores which individual satisfies Δ, she cannot, in general, have direct access to this piece of information. However, she might have indirect, non-inferential, access to it, by hearsay for instance. So *C-ignorance* does not entail *C-inf*. Suppose that a can infer that some individual satisfies Δ in a situation s. a might be in a position to infer *which* individual satisfies Δ. Then, s would violate *C-ignorance*. So, there is no logical relation between *C-ignorance* and *C-inf*.

However, there is a pragmatic relationship. When a situation conforms to *C-inf*, using an indefinite makes the ignorance interpretation most plausible, as evidenced by the contrast in (14). While (14)b is not impossible, it is more difficult to interpret than (14)a.

(14) a. Yolande a rencontré une amie, Louise
'Yolanda met a friend, Louise'
b. #Yolande a dû rencontrer une amie, Louise
'Yolanda must have met a friend, Louise'

We won't try to account for this preference here, because this would involve the notoriously complex issue of the scope of indefinites. We simply consider ignorance as the default option in the context of epistemic inferential operators. This leads one to hypothesise that, at some point in time, *quelque* was basically an evidential determiner and that the expected preference for anti-specificity has been grammaticalised as a semantic rigid feature.[4]

3.3 Epistemic dimensions

3.3.1 Habitual sentences

Habitual sentences obey *C-ignorance*, as shown by (15)

(15) a. ??A l'époque, je voyais toujours Yolande avec quelque amie, Marie
'At that time, I used to see Yolanda with some friend or other, Mary'

Habituality may facilitate an ignorance reading because it presupposes a set of eventualities. In (16)a, the speaker is unable to assign a precise identity to the friends. In (16)b, ignorance is distributed over the seeing-events: the speaker is unable to list the event-friend pairs.

(16) a. A l'époque, je voyais toujours Yolande avec quelque amie
'At that time, I used to see Yolanda with some friend or other'
b. A l'époque, je voyais toujours Yolande avec quelque amie, Marie, Pauline ou Thérèse
'At that time, I used to see Yolanda with some friend or other, Mary, Pauline or Therese'

A plausible logical form for (16)a is given in (17), which says that there is a contextually relevant past interval I such that there is an appropriate set of subintervals i hosting events e where the speaker sees Yolanda with some friend[5].

[4] We leave the evaluation of this hypothesis for future research. See Combettes (2004) for the diachrony of *quelque*

[5] As many others, we use a habituality operator analogous to the generic operator. However, we do not resort to a possible world approach, in addition to intervals and events, see Lenci and Bertinetto

(17) $\exists I(Past(I)$ & $Always_{i,e}[i \sqsubset I$ & $duration(e) = i$ & $e \models$ The speaker sees Yolanda] $[[Quelque]_x[e \models x$ is a friend of Yolanda$][e \models$ the speaker sees Yolanda with $x]])$

In view of (7), the speaker does not identify the friends in question. This is in agreement with the fact that, in (16)b, three different persons (Mary, Pauline and Therese) may be the value of the variable bound by the *quelque* operator in the different epistemic alternatives.

Unexpectedly, habituality seems to allow a violation of *C-inf* (11), since the epistemic agent may have witnessed the events she refers to. In fact the crucial factor in habituality is the existence of a sort of inference from particular occasions to a regularity. Habituality judgements present a series of particular occasions as a law-like repetition [6]. Under this view of habituality, (11) is not violated since the speaker infers the habitual proposition. As expected, a limited non-inferential repetition is not compatible with *quelque*, (18).

(18) ??J'ai vu sept fois Yolande rencontrer quelque ami
'I saw Yolanda meet some friend or other seven times'

3.3.2 Tropes

In non-inferential episodic sentences, *quelque* does not combine with count nouns or concrete mass nouns, see (19)a. Such sentences are in general fine with abstract mass nouns, see (19)b,c.

(19) a. *Yolande a bu quelque eau
'Yolanda drank some water'
b. Yolande a montré quelque courage.
'Yolanda showed some courage'
c. Il y a quelque hypocrisie à prétendre cela.
'There is some hypocrisy in this claim'

The abstract mass nouns under consideration denote external qualities (beauty), feelings (irritation) and dispositions (intelligence). As noted in Jayez and Tovena (2002), with such nouns, *quelque* has a distribution very similar to that of *un certain* 'a certain', see (20).

(20) a. Yolande a montré un certain courage.
'Yolanda showed some courage'
b. Il y a une certaine hypocrisie à prétendre cela.
'There is some hypocrisy in this claim'

(2000) for this type of approach.

[6] This inferential move has been recently mentioned by Glasbey (2006) in connection with psychological verbs that disallow bare plurals in object position. According to Glasbey, such verbs, like *to hate* or *to like*, generalise over a limited set of events

In both cases, there is a diminutive flavour. For instance, in (19)a and (20)b, the speaker implies that she is not sure that Yolanda showed courage to a high degree or in a strong form. This corresponds to a Q-implicature (Horn, 1989) triggered by the indefinite. By indicating that Yolanda exhibited a particular degree or form of courage, the speaker implicates that, for all she knows, Yolanda did not show higher degrees or clearer forms of courage. However, *un certain* and *quelque* do not match perfectly, as illustrated in (21).

(21) a. Deux individus [...] qui se caractérisaient par une certaine laideur[7]
'Two persons [...] who were characterised by a certain ugliness'
b. #Deux individus [...] qui se caractérisaient par quelque laideur
c. Il avait une certaine claudication quand il marchait
'He had a certain limp when he walked'
d. #Il avait quelque claudication quand il marchait

How do we account for these differences? Intuitively, the NP complements in (21) denote particularised properties exhibited in particular spatio-temporal settings. These instantiations of properties are usually analysed as *tropes* (Williams, 1953; Campbell, 1990; Maurin, 2002; Moltmann, 2007), i.e. particular entities that can enter similarity classes corresponding to abstract properties, like Yolanda's kindness (in the kindness class) or the colour of my car (in the colour class). So, *quelque laideur* in (21)a,b refers to the content of a 'particular' (= spatio-temporally localised) ugliness. For contrasts like those in (21), we set up a new distinction. *External* tropes are directly observed by agents. This is the case for ugliness or limp. *Internal* tropes correspond to internal states or processes of which only certain effects can be directly observed. For instance, courage and hypocrisy may show in behaviour (language, gestures, actions, etc). As a result, although an agent witnesses the symptoms of an internal trope, she may not know what trope it is. This distinction between a trope and its manifestation makes room for an inference from the latter to the former. In the terms of (11), the speaker infers that some trope exists. Note that the distinction between two kinds of tropes has lexical correlates, as exemplified in (22).

(22) a. ??Marie a montré de la beauté / laideur
'Mary showed beauty / ugliness'
b. Marie a montré du courage / de l'intelligence
'Mary showed courage /intelligence'

3.4 Ignorance and free-choiceness

As noted in the introduction, *quelque* resembles *un quelconque*, another French anti-specific determiner. In view of the fact that *un quelconque* is an epistemic free-choice

[7] Excerpt from: http://blog.lefilmfrancais.com/index.php?2006/05/25/2888-paolo-sorrentino-realisateur-de-lamico-di-famiglia

determiner (Jayez and Tovena, 2006), one may wonder whether *quelque* is in the same class. Following Jayez and Tovena (2005), we characterise free choice items as follows.

(23) **Equity** A tripartite form [FCI] [R] [S]] is compatible with an interpretation I only if:
1. *any* member of R can be S under I
2. *any* member of R can be $\neg S$ under I

(23)1 says that no member of the restriction is excluded (NO LOSER constraint), (23)2 that no member of the restriction is imposed (NO WINNER constraint). These two constraints, metaphorically subsumed under the 'Equity' label, are responsible for the following contrasts.

(24) Yolande a probablement rencontré une amie quelconque
'Yolanda probably met some friend or other'
NO LOSER: Yolanda may have met any friend of her
NO WINNER: There is no friend of Yolanda that she has necessarily met

(25) a. ??Yolande a probablement rencontré une amie quelconque, qui n'était pas Marie
'Yolanda probably met some friend or other, who was not Mary'
NO LOSER is violated
b. ??Yolande a probablement rencontré une amie quelconque, Marie
'Yolanda probably met some friend or other, (namely) Mary'
NO WINNER is violated

It turns out that *quelque* obeys NO WINNER but not NO LOSER.

(26) a. Yolande a probablement rencontré quelque amie, qui n'était pas Marie
'Yolanda probably met some friend or other, who was not Mary'
b. ??Yolande a probablement rencontré quelque amie, Marie
'Yolanda probably met some friend or other, (namely) Mary'

The fact that *quelque* obeys NO WINNER is no surprise because it is predicted by *C-ignorance*. As for NO LOSER, there is no reason why *quelque* should conform to it *if* its sensitivity to ignorance is a consequence of its evidential side, as we argue. If an agent infers that some entity satisfies a given property, she is not bound to believe also that a particular entity does not satisfy the property. There is simply nothing in *C-inf* that should lead to NO LOSER. We conclude that analogy with free choice items is superficial and that the evidential inference constraint is the core of *quelque*.

4 Negative speculations

'PPIs' like *some* are out in the immediate scope of negation. More in detail, they are not easily or not at all accepted with a narrow scope interpretation, and perceived as marked with a wide scope interpretation, if accepted. For instance, (27) is rejected or taken to be about a specific undisclosed file. This type of behaviour, noted already by Baker (1970), is at the heart of the characterisation of PPIs as items constituting a specific phenomenon.

(27) Yolanda did not find some file
*[neg $>$ *some*]

Example (5), repeated below, illustrates the same phenomenon with *quelque*, where the wide scope reading is akward although not impossible. Furthermore, like *some* (Szabolcsi, 2004), *quelque* is infelicitous in the immediate scope of antiadditive operators, whose definition is recalled in (28).

(5) #Yolande n'a pas dû trouver quelque fichier
'Yolanda must have not found some file'
??[neg $>$ *quelque*] vs. [*quelque* $>$ neg]

(28) O is antiadditive $=_{df}$ $O(a \vee b) = O(a) \wedge O(b)$

Clausal negation is antiadditive, as shown by the equivalence (John didn't see Mary or Yolanda $\Leftrightarrow$ John didn't see Mary and John didn't see Yolanda). Thus, despite the evidential touch provided by the modal, the presence of clausemate sentential negation affects the status of example (5).

Given the foregoing data, it may be worth exploring a little further the similarity between *quelque* and PPIs. Indeed, they both see their statuses restored when nested under not one but two negations (Baker, 1970; Corblin, 2004), as presented in the next subsection.

4.1 The double licensor effect

Observe that, by and large, the distribution given by Szabolcsi for *someone/something* corresponds to that of *quelque*[8]. E.g. *quelque* is licensed under extraclausal negation or after an NPI-intervener.

(29) a. Je ne pense pas que Yolande ait trouvé quelque fichier
'I don't think that Yolanda has found some file'
$\Rightarrow$ I don't think that Yolanda has found any file

[8]For *quelqu'un* 'somebody' and *quelque chose* 'something', data are more complex.

b. Yolande ne trouvait pas toujours quelque excuse
'Yolanda didn't always find some excuse'
⇒ Sometimes, Yolanda didn't find any excuse

As noted by Baker, antilicensors have the special property of seeing their effect 'undone' by another antilicensor stacked upon them. In other words, an antilicensor is compatible with a 'PPI' when both are in the scope of a higher operator, which corresponds to the 'rescuing' effect discussed by Szabolcsi and exemplified in (30) for English and French.

(30) a. I am surprised that Yolanda didn't find some file
b. Je suis étonné que Yolande n'ait pas trouvé quelque fichier

Despite the years, this rescuing effect by a second occurrence of antilicensor is an old problem whose analysis hasn't found yet real agreement upon, let alone a widely accepted explanation. Let us mention two recent proposals that witness the variety of opinions in the literature. According to Szabolcsi, 'PPIs' have two NPI ('dormant') features which get activated and/or licensed under different conditions. In short, Szabolcsi's idea, found also in (Krifka, 1991), is that combinations made up by pairs of antilicensor plus PPI behave like NPIs, which means that they require another antilicensor that works as licensor of the combination. An opposite view has been proposed by Ladusaw (1979) and recently revisited by Schwarz and Bhatt (2006), who claim that rescuing is an illusion. In the concerned configurations, according to them, the apparent antilicensor is in fact a non-antilicensing negation.[9]

It is difficult to arbitrate between these two conceptions. For one, Szabolcsi's account involves spelling out, which is difficult to control. Second, the pairs made of antilicenser+PPI and NPIs do not make a perfect match. As shown by the marginality of (31), *si* ('if'), that is a good licensor for standard NPIs, does not rescue the combination *pas+quelque* in certain cases.

(31) ??Si la police n'a pas trouvé quelque preuve, il sera relâché
'If the police didn't find some evidence, he will be freed'

Third, Schwarz and Bhatt postulate a light negation and look for a German realisation (*nicht*), which is expletive in certain environments. The expletive negation in French is *ne*, but *ne* does not behave like a 'light' negation in their terms, as illustrated by (32)c.

(32) a. Ich gehe nicht, bevor du nicht aufgeräumt hast (Schwarz and Bhatt, ex. 21)
'I won't leave before you have cleaned'
b. Je ne partirai pas avant que tu n'aies nettoyé
c. *Je suis surpris que Yolande n'ait trouvé quelque fichier
lit. I am surprised that Yolanda neg-expl have-subj found some file

[9] An NPI under Ladusaw's analysis, but see Schwarz and Bhatt (2006, 189) for a more cautious view.

Finally, it is possible to build cases that are acceptable although they feature some non-light antilicensors, such as negative concord words *rien* (nothing) and *personne* (nobody) in (33).

(33) a. Je suis surpris que rien n'ait troublé quelqu'un
'I am surprised that nothing has puzzled somebody'
b. Je suis surpris que personne n'ait vu quelque chose
'I am surprised that nobody saw something'

In the remainder, we explore a different path. Instead of arguing for or against some form of licensing, we point out the connection between the meaning of *quelque* and certain aspects of its PPI-like behaviour and we try to build on it.

4.2 Negating a composite meaning

First, recall that *quelque* is sensitive to evidentiality, as it has been proposed in this paper. By using [*quelque* R S], the speaker signals that she has only indirect and inferential evidence that an unidentified individual (Conventional Implicature part) satisfies the restriction and the scope ('at issue content', in the terms of Potts (2005)).

(34) *quelque* R S:
a. at issue content = $\exists x(x = y \ \& \ R(x) \ \& \ S(x)) = \phi$
b. CI = y is not identified and ϕ is only inferred

Next, we exploit the well established fact that negation does not see CIs in general. The scoping *pas* > *quelque* is odd in a clause because it amounts to conveying two contradictory pieces of information. On the one hand, the speaker negates the existence of an individual satisfying R and S (34)a, but on the other hand, she simultaneously signals that it must be an unidentified individual (34)b. For instance, the interpretation of example (5) comes out something like 'Yolanda must not have found any file, an unidentified one', which is queer. It is not clear how one is expected to resolve the anaphora if the antecedent is to be found within an empty set. Let us note by $\otimes$ the conjunction of at issue content and CI. Let a be the epistemic agent. The interpretation of example (5) with *quelque* under the scope of negation is provided in (35).

(35) $\Box_{\text{must-epist}}[\neg\exists x(x = y \ \& \ \mathit{file}(x) \ \& \ \mathit{found}(x)) \otimes \mathit{unknown}(y, a)]$

In words, (35) says that it is necessary from the point of view of the epistemic 'must' modality that there is no x that is a file and is found and the value of x is equal to that of an unbound variable y, and it is conventionally implicated that y is unknown to the relevant agent. Compare (35) with the wide scope interpretation of *quelque*, paraphrased as 'There is a file–an unidentified one–which Yolanda must have not found'.

This is for the behaviour of *quelque* under one sentential clausemate negation. Extra-clausal negation does not count as antilicensor, as it was pointed out above with respect to (29)a. In our proposal, we notice that this negation is fine when it provides the evidential touch, as in (36) where 'not-excluding' means 'accepting as possible'.

(36) Je n'exclus pas que Yolande ait trouvé quelque fichier
'I do not exclude that Yolanda might have found some file'

For other examples, we ascribe the improvement in the status of the sentence to the fact that the CI of ignorance is integrated into the interpretation because intermediate scope is possible. The sequence [$_{\text{matrix clause}}$Neg XP] [$_{\textit{that clause}}$ *quelque* R S] negates the existence of a situation where some individual, an unidentified one, satisfies R and S. Sentence (37)a reports Mary's personal thought and is acceptable. It is paraphrased as 'According to Mary, it is not the case that, for some scruple s, an unidentified one, Yolanda experienced s'. On the contrary, sentence (37)b, paraphrased as 'Mary did not say that for some scruple s, an unidentified one, Yolanda experienced s', reports Mary's words and is more marginal. The problem in interpreting it is that it is unclear whether (and how) the form of words used by Mary involves non-identification.

(37) a. Marie ne pense pas que Yolande ait eu quelque scrupule
'Mary does not think that Yolanda had some scruple'
b. ?Mary n'a pas dit que Yolande avait eu quelque scrupule
'Mary didn't say that Yolanda had had some scruple'

More generally, there is some improvement whenever negation targets a situation that would license the use of *quelque*. Possible causes for this improvement are the local computation of felicity[10] and the presence of subjunctive in French, which indicates a possible (but unrealized) situation, see the examples with semantic negation and regular negation in (38). At the present moment, we see no evidence in favour of one cause and against the other. In the end, it may well be the case that both contribute.

(38) a. Il est faux que Yolande ait trouvé quelque fichier
'It is false that Yolanda has found some file'
b. Il n'est pas vrai que Yolande ?a / ait trouvé quelque fichier

Finally, as for (29)b, *toujours* acts as a quantifier on situations. The sentence says that it is not the case that, for a given period T, $\forall s \in T[_s$ *quelque* R $S]$. As pointed out already by Culioli, *quelque* is licensed by habitual operators.

(39) [(29)b] Yolande ne trouvait pas toujours quelque excuse
'Yolanda didn't always find some excuse'

[10] On this point, we refer the reader to the ongoing discussion about local/global implicatures.

Independent evidence supporting our proposal of exploiting the meaning of *quelque*, rather that stipulating licensing/antilicensing constraints, comes from the striking parallelism with the expression *Je ne sais quel* (lit. 'I don't know which'), which has gone unnoticed in the literature, to the best of our knowledge. The data in (40) show that *Je ne sais quel* with narrow scope is awkward in the scope of clausemate sentential negation, see (40)a, while negation in a higher clause does not affect it, see (40)b. This is all the more interesting because *Je ne sais quel* is generally not considered to be polarity sensitive.

(40) a. #Yolande n'a pas trouvé je ne sais quel fichier
'Yolanda did not find I do not know which file'
b. Marie ne pense pas que Yolande ait trouvé je ne sais quel fichier
'Mary does not believe that Yolanda found I do not know which file'

5 Concluding remarks

Quelque is an indefinite determiner that marks that the existence of an entity satisfying restriction and scope is information gained via inference. The availability of this type of reading suffices to make its use felicitous. This 'light' way of constraining its use, as opposed to heavier constraints expressed in terms of syntactico-semantic marked contexts, makes it possible to encompass a distribution that cannot be characterised in terms of licensing configurations. The relevance of the distinction between external and internal tropes is an example in point. Furthermore, our analysis draws attention to the fact that the nominal domain may also convey evidential information, although evidentiality is most often discussed with respect to the verbal domain.

Cases of items that exhibit free choiceness and negative polarity sensitivity are well known, e.g. English *any*. The proximity of free choiceness with positive polarity is more rarely mentioned. At first sight, *quelque* might look as a candidate to this double labelling, but we show that both labels do not help us to unravel its meaning. The unfelicity of *quelque* under clausemate negation is a manifestation of the more general issue of computing implicatures. The striking similarity with the behaviour of *je ne sais quel*, which can be treated as a case of conflict with the CI, provides support to our position.

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Contrast and Underspecification. The Semantics of *aber* and *doch* *

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Abstract

I present an unitary analysis of the German adversative connectors *aber* and *doch*, based on Sæbø (2003), where the semantics of these connectors is defined in terms of a presupposition involving negation and topic alternatives. I argue that the meaning of *aber* and *doch* is underspecified between various types of contrast and that the type of contrast they indicate in particular context is determined by the configuration of topic alternatives at hand, which in turn is correlated with the particular syntactic and prosodic properties of the connectors in the concrete discourse as well as with the type of discourse (coordination, dialogue) in which the connectors are used. Finally, I sketch an underspecified semantic representation of the meaning of *aber* and *doch* and hint at a disambiguation algorithm that allows the bottom up construction of discourses with these connectors starting from their underspecified representation and employing information about their syntactic and prosodic properties as well as about the information structure and the discourse structure of the particular context in which they occur.

1 Introduction

The precise meaning specification of discourse connectors is a longstanding linguistic challenge. One of the reasons why the meaning of these words is so hard to grasp is related to their great ambiguity: depending on the context in which they are used, discourse connectors may express various relations between different discourse objects. Another problem is related to the lack of sound formal definitions of the discourse relations that connectors may express.

In this paper, I present an unitary analysis of the German adversative connectors *aber* and *doch*, based on Sæbø (2003). Sæbø proposes a full specification of the semantics

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of the adversative conjunction *aber* on the basis of a precise notion of contrast which involves negation and topic alternatives. I show that Sæbø's definition of contrast is extendable to uses of *aber* not considered by Sæbø, as well as to all uses of the other main adversative German connector *doch*. I also provide an analysis of the contextual conditions under which a particular interpretation of the connectors arises and propose a semantic representation of *aber* and *doch* where the meaning of these connectors is lexically underspecified between these different interpretations. Finally, I hint at a disambiguation algorithm that allows the bottom up construction of discourses with *aber* and *doch* starting from the underspecified representation of their meaning and utilizing information about syntactic and prosodic properties of the connectors as well as about the information structure and the discourse structure of the concrete discourse in which they occur.

2 The problem

The German discourse connectors *aber* and *doch* express various relations, such as semantic opposition, concession and correction. There is a partial overlap between *aber* and *doch* with respect to the relations they may indicate. For instance, both *aber* and *doch* may express semantic opposition, as in (1), where two mutually exclusive properties are contrasted:

(1) Hans ist reich, $\left\{ \begin{array}{c} \text{aber} \\ \text{doch} \end{array} \right\}$ Peter ist arm.
'Hans is rich but Peter is poor.'

Further, they may express concession[1], as in (2), which expresses the denied expectation that catholics normally go often to church:

(2) Peter ist katholisch, $\left\{ \begin{array}{c} \text{aber} \\ \text{doch} \end{array} \right\}$ er geht nicht oft in die Kirche.
'Peter is a catholic but he doesn't go often to church.'

Finally, both *aber* and *doch* can express correction, as in (3), where speaker B contests the validity of the preceding assertion, here by asserting the sheer opposite:[2]

(3) A: Es stimmt nicht, dass Peter verreist ist.
'It is not true that Peter has left.'
B: Es stimmt $\left\{ \begin{array}{c} \text{aber} \\ \textit{doch} \end{array} \right\}$.

[1] I call here concession both relations known as "denial of expectation" and "concessive opposition" which have been shown to be different instantiations of one and the same underlying concessive scheme, cf. Grote, Lenke and Stede (1997).

[2] Small capitals denote accent.

'But it IS true.'
B': Doch.
'It IS correct.'

The fact that *aber* and *doch* are not fully synonymous is attested by cases like (4) where in (4-a) *aber* expresses a rather weak denial, whereas *doch* in (4-b) expresses a straightforward correction:

(4) A: Peter kommt mit ins Kino.
'Peter is coming with us to the cinema.'
a. B: Er ist aber verreist. (Wie ist das möglich?)
'But he has left. (How can then this be?)'
b. B: Er ist doch verreist. (Das kann nicht sein!)
'He has left, as you should know. (This cannot be true!)'

Further, there are cases like (5)-(8), where only *doch* can be used. In (5), (7) and (8), *doch* expresses correction, and in (6) concession (denial of expectation).[3]

(5) A: Peter kommt nicht mit ins Kino.
'Peter is not coming to the cinema.'
B: Er ist also $\left\{ \begin{array}{c} \text{DOCH} \\ \text{*aber} \end{array} \right\}$ verreist.
'So he has left, after all.'

(6) Das Pferd war klein, seine Beine waren kurz, und $\left\{ \begin{array}{c} \text{DOCH} \\ \text{*aber} \end{array} \right\}$ war es der schnellste Renner weit und breit.
'The horse was small, his legs were short, and yet he was the fastest runner far and wide.'

(7) A: Es stimmt nicht, dass Peter verreist ist.
'It is not true that Peter has left.'
B: $\left\{ \begin{array}{c} \text{DOCH} \\ \text{*Aber} \end{array} \right\}$.
'Yes it is.'

(8) Peter kommt nicht mit, oder $\left\{ \begin{array}{c} \text{DOCH} \\ \text{*aber} \end{array} \right\}$?
'Peter is not coming along, is he?'

As the data suggests, the different uses and interpretations of *aber* and *doch* possess different syntactic, prosodic and discourse-structural properties. I.e. they may occur in the forefield, before the forefield or in the middle field of the German sentence, they

[3]Of course, *aber* can be used in (6) instead of *und*, which is a further evidence that *aber* and *doch* are not fully synonymous since they can nonredundantly cooccur in one and the same clause.

may be accentuated or not, and they may be used in coordinated clauses or in denial sequences in dialogue.[4]

The most challenging question that poses itself with respect to the semantics of discourse connectors in general, is, whether, and how the different uses and interpretations of a connector can be assigned a basic meaning. This question is typically answered for adversative connectors like *aber* and *doch* by assuming a basic meaning "contrast", however without further defining this notion. Consequently, the more fundamental question should be how to define the notion of contrast in a precise and flexible enough manner such that it accounts for the various uses of contrastive connectors like *aber* and *doch*. At least as important is the reverse question, namely how can the various interpretations of a connector be derived from its basic meaning. Answering this question presupposes a thorough analysis of the correlations between the various uses of a connector and its particular syntactic, prosodic and discourse-structural properties on the one hand and the particular interpretation it gets on the other.

In my proposal, I address these questions by drawing on a notion of contrast that seems to fulfill the requirements of precision and flexibility mentioned above, namely that specified in Sæbø (2003), where based on this notion a full specification of the meaning of the conjunction *aber* is proposed. I present Sæbø's analysis of *aber* next.

3 The contrast presupposition of *aber*

The main idea in Sæbø (2003) is that semantic opposition is the basic contrast relation expressed by *aber* from which other kinds of contrast such as various forms of concession can be derived as a result of generating conversational implicatures based on Grice's Maxim of Relevance. The main observation is that the discourse relation of contrast interacts with information structural contrast, namely contrast between topic or focus alternatives.[5] More precisely, Sæbø argues that the contrast between two conjuncts C_1 and C_2 expressed by *aber* can be seen as a semantic opposition between the topic of the *aber*-clause C_2 and an alternative to the C_2-topic that is provided by the first conjunct C_1. Thus contrast that in general consists in attributing "mutually exclusive sentence frames to two different things", can be formulated as "the first sentence contradicts the result of replacing the topic in the second sentence by an alternative in the first sentence". For instance in (9), replacing the topic of C_2, *mittlere*, for the topic of C_1, *kleine*, would lead to the two contradicting assertions (9-a) and (9-b):

(9) [Für [kleine]$_T$ Betriebe hält sich der Schaden noch in Grenzen]$_{C_1}$; [für [mittlere]$_T$ aber wird er allmählich ruinös]$_{C_2}$.
'For small companies, the harm is yet limited; for intermediate-size companies, however, it is becoming ruinous.'

a. Für kleine Betriebe hält sich der Schaden noch in Grenzen.

[4]The sentence equivalent *doch* (cf. (7)) can also be used in confirmation moves, where it also expresses correction, in this case a correction of an assumed contrary opinion as argued in Karagjosova (2006).

[5]An analysis of *aber* based on similar observations is proposed in Umbach (2005).

b. Für kleine Betriebe wird der Schaden allmählich ruinös.

Based on this observation, Sæbø specifies the basic meaning of *aber* in terms of an assertion and a presupposition in dynamic semantics in the following way: *aber* in a construction 'ϕ *aber*' asserts the sentence ϕ and triggers a presupposition that requires that the context σ contradicts the result of substituting the topic T of the *aber*-clause with an alternative α. Formally:

(10) $\sigma\ [\![\phi \text{ aber}]\!]\tau$ iff $\sigma \models \neg\phi[T(\phi)/\alpha]$ for some alternative α and $\sigma\ [\![\phi]\!]\tau$

On closer inspection, the definition can be further strengthened with respect to the context σ and the alternative α: it is always the preceding clause C_1 in a construction 'C_1 *aber* C_2' that provides both the alternative and the context in which the presupposition must be verified.

Consider again (9), repeated below as (11). After substituting the topic of the *aber*-sentence, *mittlere*, for the alternative, here the topic of C_1 *kleine*, we get that the harm for small companies is not ruinous. This is entailed by C_1, which here represents the context σ, since C_1 asserts that the harm is limited.

(11) [Für [kleine]$_\alpha$ Betriebe hält sich der Schaden noch in Grenzen]$_{C_1}$; [für [mittlere]$_T$ aber wird er allmählich ruinös]$_{C_2}$.
$\sigma \models \neg\phi[T(\phi)/\alpha]$ iff
$\sigma \models \neg$(für mittlere Betriebe wird der Schaden ruinös)[mittlere/kleine] iff
$\sigma \models \neg$(für kleine Betriebe wird der Schaden ruinös)

Sæbø considers further cases where the topic and the alternative cannot be identified as straightforwardly as in cases involving contrastive topics such as (9). In (12), the contrast presupposition is falsified if we take *kurz* to be the topic and *steil* the alternative:

(12) Die Waldwege sind [steil]$_{\alpha?}$, aber [kurz]$_{T?}$.
'The forest paths are steep but short'.
$\sigma \models \neg\phi[T(\phi)/\alpha]$ iff
$\sigma \models \neg$(die Waldwege sind kurz)[kurz/steil] iff
$\sigma \models \neg$(die Waldwege sind steil)

The reason is that *kurz* is rather the focus of the *aber*-sentence. According to Sæbø, in cases like (12), an *implicit topic* must be reconstructed in order to get the contrast right and the presupposition verified. The "implicit topic" is in general the complement of the apparent focus. Thus in (12), the implicit topic is *lang*. With this "topic", the contrast makes more sense since it suggests an alternativeness relation between the properties *steep* and *long* of paths, rather than between *steep* and *short*. According to Lang (1977), coordination alternatives like the ones involved in *aber*-constructions

require a Common Integrator, that is, a relevant parallel between them.[6] For (12), such a relevant parallel would be that steep and long paths are both strenuous (Sæbø (2003)). This is more evident in (13) where instead of *kurz* its negated complement (antonym) *lang* is used and where the presupposition is easily verified:

(13) Die Waldwege sind [steil]$_\alpha$, aber nicht [lang]$_T$.
'The forest paths are steep but not long'.
$\sigma \models \neg\phi[T(\phi)/\alpha]$ iff
$\sigma \models \neg(\neg$(die Waldwege sind lang)[lang/steil] iff
$\sigma \models \neg\neg$(die Waldwege sind steil)

The derivation of the Common Integrator is a pragmatic process (generation of Relevance implicature) as a result of which the concessive interpretation of the contrast arises (Sæbø (2003)): the first conjunct supports the proposition that the paths are strenuous, whereas the second runs against it.

Sæbø argues further that the identification of the implicit topic involves a process of accommodating the information that along with a certain property or proposition goes another property or proposition.[7] This accommodation in turn triggers the Relevance implicature that leads to the concessive interpretation. I.e., the identification of the alternatives leads to the search for a Common Integrator.

As intuitive as the analysis of cases like (12) is, it does not become entirely clear how the implicit topic is identified. In particular, it is not clear what role the Relevance implicature plays in recovering the implicit topic. It seems that the two processes are intertwined, which creates the impression that accommodating the alternativeness relation is based on generating a Relevance implicature, which is somewhat problematic as it suggests that conversational implicatures are generated on the basis of a semantically incomplete sentence (since the contrast presupposition is not yet processed). Also, the notion of "topic" utilized by Sæbø remains rather vague as it does not correspond to the structural topic. According to Sæbø, topic is "the portion of the sentence for which the context supplies a substitute". On closer inspection, one could argue that "the portion of the sentence for which the context supplies a substitute" is information that is in some way already given, inferable or recoverable from the current discourse situation. Consider for instance the case of contrastive topics. Contrastive topics come with a parallel sentence structure and particular intonation (at least in German, called "hat contour") that evoke a set of alternative expressions. The mention of the topic of the first conjunct evokes a set of alternatives from which the topic of the *aber*-clause is recoverable and is in this sense given information. In cases like (13), the "portion of the sentence for which the context supplies a substitute" is in the scope of the negation, and

[6]Notice that the notion of "coordination alternatives" is different from the information-structural notion of topic or focus alternatives. There are cases involving *aber* where the two kinds of alternatives coincide, as in the cases involving contrastive topic like (9), where the coordination alternatives are also topic alternatives to each other. In other cases, like the forest-paths example, they don't. Here, the focus alternatives *steil* and *kurz* are not the coordination alternatives that are contrasted by means of the adversative construction.

[7]Or other ontological entities, as Sæbø shows.

negation is generally known to trigger the implicature that the opposite is normally the case (cf. e.g. Jacobs (1991)), hence the element in the scope of the negation is in a way given in the context.

Consequently, Sæbø's notion of topic seems to be better understood in the sense of information given by the "discourse topic" or "question under discussion". This view is also supported by Umbach's (Umbach (2005)) observation on the behaviour of *but*-conjunctions which always involve the confirmation and the denial of an explicit or implicit discourse topic called "Quaestio". This is what she calls the "denial condition" which *but* imposes on its context. Thus, the Quaestio for (13) would be:[8]

(14) a. Q: Sind die Waldwege steil? Und sind sie auch lang?
'Are the forest paths steep? And are they long too?'
b. [**yes**] Die Waldwege sind steil, aber [**no**](sie sind) nicht lang.
'The forest paths are steep but not long.'

Crucially, the Quaestio for (12) is the same:

(15) a. Q: Sind die Waldwege steil? Und sind sie auch lang?
'Are the forest paths steep? And are they long too?'
b. [**yes**]Die Waldwege sind steil, aber [**no**](sie sind nicht lang, sie sind) kurz.
'The forest paths are steep but short.'

In both cases, the *aber*-conjunct is a denial of the second part of the Quaestio. Thus it seems that Sæbø's implicit topic is given by Umbach's Quaestio and can be reconstructed on the basis of the denial condition: if the *aber*-connect does not contain contrastive topic or an explicit negation, the complement of the focus can be reconstructed as the implicit topic. Where negation is overt, as in (14-b), the material in the scope of the negation counts as the "topic", in the sense of material given by the implicit Quaestio. Thus taking Umbach's denial condition into consideration gives us a handle on the process of derivation of the implicit topic.

4 *Aber* in denials

As already mentioned, the contrast presupposition was meant to provide a full specification of the meaning of *aber*. However, Sæbø does not consider cases of *aber* used in denial sequences. In this section I will show that the contrast presupposition applies to these cases as well. Consider (16).

(16) A: Peter [lügt]$_\alpha$ nicht.
'Peter is not lying.'

[8]Notice that in (14-b), the focus is on *nicht*, not on *lang*, making *lang* the background, which supports a view on *lang* as given material in the sense of information given by the Quaestio.

B: Er [lügt]$_{VF}$ aber.
'But he IS lying.'

Here we have a case of explicit denial where one and the same material is successively negated and asserted. The verb in the *aber*-utterance carries verum focus which is also associated with old information (Höhle (1992)): it is already mentioned in the preceding utterance. The verum focus here can therefore be assumed to be the "topic" of the contrast presupposition, and the alternative is the same verb in the preceding utterance. Here, the presupposition reduces to the requirement that the context should entail the negation of the *aber*-sentence:

(17) $\sigma \models \neg\phi[T(\phi)/\alpha]$ iff
$\sigma \models \neg$(Peter lügt)[lügt/lügt] iff
$\sigma \models \neg$(Peter lügt)

Thus correction can be viewed as a special case of Sæbø's contrast.[9]

In cases of implicit denials like (4-a), repeated below as (18), the analysis is similar to the cases where *aber* is a conjunction.

(18) A: Peter [kommt mit ins Kino]$_{\alpha}$.
'Peter is coming to the cinema.'
B: Er ist aber [verreist]$_{F}$.
'But he has left.'

Here, the "topic" is the complement of the focus, e.g. *ist in der Stadt*. The alternative is the focus of the preceding utterance, *kommt mit ins Kino*. The presupposition can be verified: we get that the context entails that Peter is coming along, which is indeed so.

(19) $\sigma \models \neg\phi[T(\phi)/\alpha]$ iff
$\sigma \models \neg\neg$ (Peter ist in der Stadt) [ist in der Stadt/kommt mit ins Kino] iff
$\sigma \models$ Peter kommt mit ins Kino

Summing up, the contrast presupposition seems to adequately grasp the meaning of *aber* in coordinative conjunctions as well as in denial sequences. Notice that the meaning of *aber* is in fact underspecified between different kinds of "topics" that are contrasted with different kinds of alternatives. The "topic" can be a contrastive topic, the complement of the focus, the element in the scope of the (focussed) negation, or verum focus. The alternative may or may not coincide with the "topic". What is also important is that the context for verifying the presupposition in the case of *aber* is always the preceding sentence or utterance, which is not always so in the case of *doch*, and it seems that accommodation of the presupposition is not possible.

[9]Cf. related observations in Umbach (2004) who argues that correction cases involve just like contrastive cases a denial excluding one of two alternatives.

5 Doch

The connector *doch* is more versatile than *aber* in its uses and interpretations. As a conjunction, it is synonymous with *aber* in coordinative constructions (although it does not share its positional flexibility)[10]: in other positions, *doch* gets a different interpretation. Consequently, the same analysis applies for the conjunction *doch* as for the use of *aber* as a coordinative conjunction. Also here the "topic" can be a contrastive topic (20-a), the complement of the focus (20-b) or the element in the scope of the focussed negation (20-c).

(20) a. Für $[\text{kleine}]_\alpha$ Betriebe hält sich der Schaden noch in Grenzen, $\left\{ \begin{array}{c} \text{aber} \\ \text{doch} \end{array} \right\}$ für $[\text{mittlere}]_T$ wird er allmählich ruinös.

b. Die Waldwege sind $[\text{steil}]_\alpha$, $\left\{ \begin{array}{c} \text{aber} \\ \text{doch} \end{array} \right\}$ $[\text{kurz}]_F$.

c. Die Waldwege sind $[\text{steil}]_\alpha$, $\left\{ \begin{array}{c} \text{aber} \\ \text{doch} \end{array} \right\}$ nicht $[\text{lang}]_T$.

The more interesting uses of *doch*, the ones that do not have *aber*-counterparts, are positioned in the middle field or the initial field or are sentence equivalents used as answers or as the second part in alternative questions (with the first part negated). In all these cases, *doch* gets a corrective interpretation.[11]

[10] *aber* has three possible positions: left adjoined to the middle field, right adjoined to the forefield or left of the forefield, cf. Sæbø (2003).

[11] There are some distributional issues here. In implicit denials, only unaccented MF-*doch* can be used:

(i) A: Peter kommt mit.
  a. B: Er ist doch VERREIST.
  b. B: # Er ist DOCH verreist.

In explicit denials, accented *doch* is more appropriate. Unaccented *doch* is rather marginal (ii)b., dito immediately succeeding full-fledged sentence with accented *doch* (ii)c. instead of the sentence equivalent (ii)a. Accented MF-*doch* is more appropriate with intervening material, cf. (iii). An exception are cases like (iv) where the correction of A's statement is carried out by means of the negation and *doch* expresses a correction of previous belief. These distributional constraints must be of a pragmatic nature, e.g. economy reasons, since the uses of *doch* in the marginal cases are not fully out.

	A: Das stimmt nicht.	A: Das stimmt.
(ii) a.	B: DOCH.	B: # DOCH.
b.	B: Es STIMMT doch.	B: Es STIMMT doch nicht.
c.	B: Es stimmt DOCH.	B: Es stimmt DOCH nicht.

(iii) A_1: Es geht nicht.
B_1: Du musst die Schraube drehen.
A_2: Hast recht, es geht DOCH.

(iv) A: Peter ist verreist.
B: Er ist DOCH nicht verreist.

Finally, initial-field *doch* as in (6) is used as a clause connector and expresses denial of expectation, which can also be viewed as a case of a correction pertaining to default expectations.

I will look at these uses in turn.

5.1 Middle-field *doch*

In the middle field (MF), two prosodically different uses of *doch* have to be distinguished: accented and unaccented *doch*, both of which express correction. In coordination contexts, neither prosodic variant of MF-*doch* marks a relation of contrast between the two conjuncts but rather a causal relation. Consider (21).

(21) a. Peter kommt nicht mit. Er ist doch VERREIST.
'Peter is not coming along. He has left, as you should know.'
b. Peter kommt nicht mit. Er ist DOCH verreist.
'Peter is not coming along. He has left, after all.'

The crucial intuition is that compared to *aber*, both prosodic variants of MF-*doch* here signal a different kind of contrast that takes its antecedent from a more distant part of the discourse than the immediately preceding sentence, in contrast to *aber*, cf. (22) which is infelicitous since no reasonable contrast between being out of town and not coming along can be made sense of:

(22) Peter kommt nicht mit. # Er ist aber verreist.
'Peter is not coming along. But he has left.'

Intuitively, both kinds of MF-*doch* in (21) suggest that the complements of the propositions that the *doch*-sentences express (may) have been considered earlier. This possibility is however not licensed by the sentences preceding the *doch*-sentences but it is excluded by them (as the proposition that *Peter is not coming along* is consistent with the proposition *Peter has left town*). The *doch*-sentences represent rather corrections of, assumed or actual, previous contrary assumptions of the speaker, hearer or both.

The two prosodic variants of middle-field *doch* express however corrections of different sorts. I will take a closer look at the two MF-*doch*s next.

5.1.1 Unaccented MF-*doch*

The unaccented MF-*doch* indicates intuitively that the proposition expressed by the sentence belongs to the common knowledge of speaker and hearer.[12] The correction

[12]This holds in general also for nondeclarative uses of this *doch*, as argued in Karagjosova (2004). I will only consider declarative uses here, assuming that the present analysis is compatible with the

pertains to the set of propositions that are assumed to be common knowledge. It is triggered by a manifested or hypothetical deviant opinion on the part of the interlocutor, as in (23), where A demonstrates lack of knowledge of the assumed common ground proposition *Peter is out of town*: from the assertion that Peter is going to the cinema speaker B can infer on the background of general world knowledge and assumptions of cooperativity that A does not know or is currently not aware of the fact that Peter is out of town since otherwise he would not have asserted (23)-A:

(23) A: Peter kommt mit ins Kino.
'Peter is coming to the cinema.'
B: Er ist doch VERREIST.
'But he has left (as you should know).'

The fact that this *doch* marks the proposition as given information suggests that the "topic" we are dealing with here can be identified with the entire sentence, e.g. that Peter has left in (23). The alternative is identical with the "topic", and its negation is suggested by the context. Indeed, the contrast presupposition can be verified in the context of utterance A: the sentence that Peter has not left can be reasonably assumed to follow from the sentence that Peter is coming along to the cinema.

(24) $\sigma \models \neg\phi[T(\phi)/\alpha]$ iff
$\sigma \models \neg$ (Peter ist verreist) [Peter ist verreist/Peter ist verreist]
$\sigma \models \neg$ (Peter ist verreist)

There are also cases where the context does not immediately provide a demonstration of a lack of assumed common knowledge with respect to the *doch*-proposition, i.e. where the presupposition cannot be verified by the preceding utterance or the more remote discourse context. There however accommodation is possible, giving rise to a "preventive" corrective reading of this *doch*, a hypothetical misconception that the speaker wants to rule out at the outset.[13]

5.1.2 Accented MF-*doch*

The accented MF-*doch* expresses, similarly to its unaccented counterpart, that the opposite of what is asserted by the *doch*-utterance was considered earlier. However, in the case of this *doch* the correction does not necessarily pertain to the common knowledge of the interlocutors. It may be used in cases where the interlocutor, both or the speaker himself held the opposite belief at some earlier point in time, i.e. it can express also self-correction. Consider (25).

nondeclarative ones as well.

[13] A similar function is fulfilled by the sentence equivalent *doch* used in confirmations, as argued in Karagjosova (2006).

(25) A_1: Es geht nicht.
'It does not work.'
B_1: Du musst die Schraube drehen.
'You have to turn the screw.'
A_2: Hast recht, es geht DOCH.
'You are right, it works after all.'

In (25)-A_2 it is reasonable to assume a "topic" that can be reconstructed as the complement of the focus. The focus here is *doch* itself, and a sensible candidate for the complement of focussed *doch* is the sentential negation *nicht*.[14] The alternative coinsides with the topic and the presupposition can be verified, albeit not in the context of the immediately preceding utterance, but in the wider discourse context, here A_1:

(26) $\sigma \models \neg\neg$(es geht nicht)[nicht/nicht] iff
$\sigma \models$ es geht nicht

In parallel to its unaccented counterpart, accented MF-*doch* may be used in a context that does not immediately verify the contrast presupposition. There however the presupposition can easily be accommodated. In such cases we deal with corrections whose corrigendum was not verbalised.

5.2 The sentence equivalent *doch* and conjunct adverb *doch*

The remaining uses of *doch* fit into the analysis of accented middle-field *doch*. The sentence equivalent *doch*, as in (7) and (8), is accented and expresses correction: the "topic" of the contrast presupposition is the complement of focussed *doch*, i.e. the sentential negation, and coincides with the alternative. The preceding utterance provides the alternative and verifies the presupposition. In the case of the conjunct adverb *doch*, as in (6), which is positioned in the initial field of the sentence and is also accented, the contrast presupposition is also reduced to the requirement that the context entails the negated counterpart of the *doch*-clause. The difference to middle-field *doch* is that conjunct adverb *doch* functions as a clausal connector which requires that the first conjunct provides the alternative and the context for verifying the presupposition. This requirement leads to the concessive (denial of expectation) interpretation of this *doch*, as argued in Karagjosova (to appear).

5.3 The basic meaning of *doch*

Summing up, the contrast presupposition seems to be applicable to all uses of *doch* as well as to *aber*. This meaning is underspecified as well, as we have different kinds of "topics" contrasted with different kinds of alternatives. The "topic" can be again a

[14] Semantically, *doch* is an assertion operator, it asserts the sentence in its scope without influencing its truth conditions. The complement of the assertion operator is the negation operator.

contrastive topic, the complement of the focus, the element in the scope of the focussed negation[15] and the alternative may or may not coinside with the "topic". In contrast to *aber*, the context for verification may be more remote, and there are cases where the presupposition can be accommodated.[16]

6 Contrast and underspecification

Now we can go back to the questions raised in section 2. So far, we have seen that the contrast presupposition defined by Sæbø generalises over all uses of *aber* and *doch* and can be assumed as the basic meaning of these adversative connectors. We also saw that the meaning of *aber* and *doch* is underspecified, as we deal with different "topics" that are opposed to different alternatives depending on how the connector is used.

The various interpretations of the connectors can be seen as a function of different instantiations of the contextual parameters "topic" and "alternative", which in turn correlates with syntactic and prosodic properties of the particles such as syntactic position and accent, as well as with the discourse configuration at hand (coordination or denial). In other words, the difference between *aber* and *doch* and among their variants is a matter of association of different kinds of "topics" with different alternatives in different contexts, which render various kinds of contrasts.

Table 1 shows the contextual parameters defining both the different syntactic, prosodic and discourse-structural uses of *aber* and *doch* and their interpretations.[17] For instance, *aber* in a coordinative construction 'C_{i-1} *aber* C_i' contrasts the contrastive topic (CT), the complement of the focus ($\overline{F}$) or the element in the scope of the focussed negation (neg-T) in the *aber*-sentence with some alternative that is provided by the first conjunct C_{i-1}. This alternative is different from the topic ($\alpha \neq T(\phi)$) and is either the contrastive topic or the focus of the first conjunct respectively. The context for verifying the contrast presupposition is the first conjunct ($\sigma = C_{i-1}$).[18] The same holds for the conjunction *doch*. The interpretation of these variants of *aber* and *doch* is that of semantic opposition, and cases of concession are pragmatically derived as shown in Sæbø (2003). In explicit denials, the "topic" is the verum focus, the alternative coincides with it and is provided by the immediately preceding utterance U_{i-1}, and the context for verification of the presupposition is the immediately preceding utterance. The interpretation is that of correction. In the case of MF-*doch* in coordination contexts, the "topic" is either the entire sentence (unaccented *doch*) or the complement of the focus (accented *doch*); the alternative coincides with the "topic" and is not provided by the first conjunct ($\sigma - C_{i-1}$). The context in which the presupposition can be verified does not include the first conjunct. These *doch*-variants get a correction interpretation.[19]

[15] Or verum focus, as in (ii)a-c.

[16] The last two facts are probably related, as accommodation is not possible only in the cases where *doch* functions as conjunction and conjunct adverb and the context for verification is the first conjunct.

[17] Here, neg-T(ϕ) is the element in the scope of the negation in cases like (13).

[18] Here, I only deal with the case where α is of a propositional type. It can be of other types, as shown in Sæbø (2003), such as individuals, times, locations etc.

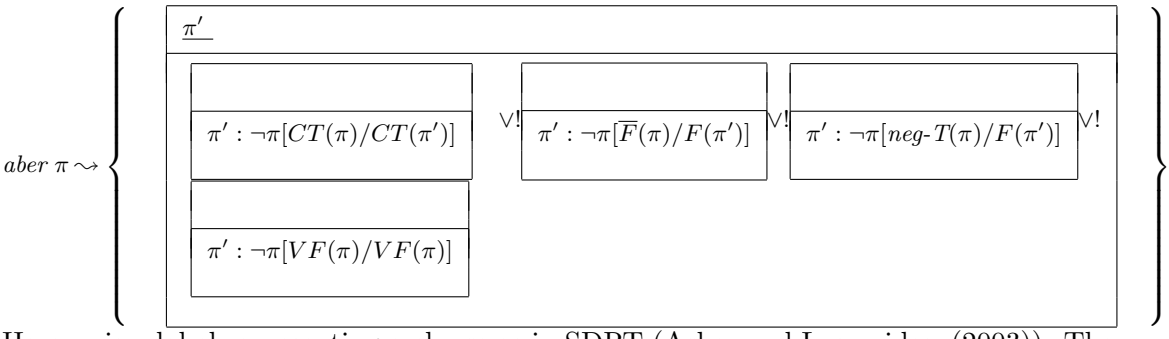
[19] In the case of initial-field *doch*, we have also a kind of correction, insofar as denial of expectation

Table 1: The contextual parameters

	coordination	explicit denial	implicit denial
aber ϕ	$T(\phi) = CT(\phi)$ or $\overline{F}(\phi)$ or neg-T(ϕ) $C_{i-1} \models \alpha^*$ $\alpha \neq T(\phi)$ $\alpha = CT(C_{i-1})$ or $F(C_{i-1})$ $C_{i-1} = \sigma$	$T(\phi) = VF(\phi)$ $U_{i-1} \models \alpha$ $\alpha = T(\phi)$ $U_{i-1} = \sigma$	$T(\phi) = \overline{F}(\phi)$ or neg-T(ϕ) $U_{i-1} \models \alpha$ $\alpha \neq T(\phi)$ $\alpha = F(U_{i-1})$ $U_{i-1} = \sigma$
ψ *doch* ϕ	–"–		
MF-*doch* ϕ	$T(\phi) = \phi$ $C_{i-1} \not\models \alpha$ $\alpha = T(\phi)$ $\sigma - C_{i-1}$		$T(\phi) = \phi$ $U_{i-1} \models \alpha$ $\alpha = T(\phi)$ $U_{i-1} = \sigma$
MF-DOCH ϕ	$T(\phi) = \overline{F}(\phi)$ $C_{i-1} \not\models \alpha$ $\alpha = T(\phi)$ $\sigma - C_{i-1}$	$T(\phi) = \overline{F}(\phi)$ $U_{i-1} \models \alpha$ $\alpha = T(\phi)$ $U_{i-1} = \sigma$	
SE-DOCH		–"–	
IF-DOCH	$T(\phi) = \overline{F}(\phi)$ $C_{i-1} \models \alpha$ $\alpha = T(\phi)$ $C_{i-1} = \sigma$		

An adequate representation of the meaning of *aber* and *doch* should reflect these different configurations in my view, as they seem to systematically correlate with the different interpretations of the connectors. A further motivation for a more fine-grained representation is the fact that *aber* and *doch* are not completely synonymous, since *aber* has not parallel uses specialized for expressing common knowledge or concession the way *doch* does, and MF-*doch* does not have the same interpretation as MF-*aber*. In order to be able to differentiate between *aber* and *doch* on the lexical level, a different format is needed for specifying the basic meaning of the two connectors.

One possibility to do this is in terms of lexical underspecification, more closely by representing the ambiguity of *aber* and *doch* in terms of underspecified alternations in UDRT (Reyle et al. (2005)), i.e. sequences of alternative DRSs. The underspecified lexcial entry for *aber* will look like this:



Here, π is a label representing a clause as in SDRT (Asher and Lascarides (2003)). The definition says that *aber* triggers the presupposition that there is a sentence π' in the

can be viewed as correcting a default inference by assuming its opposite.

discourse context such that π' is the negation of the result of replacing the different "topics" of π by the respective alternatives. The entry for *doch* will have the two additional alternations in (27) capturing the two cases of middle-field *doch*. The entry for the unaccented MF-*doch* reflects its additional common knowledge component, namely that the speaker believes the sentence to be given information:

(27)

$\pi' : \neg\pi[\pi/\pi]$ $B_S\, GIVEN(\pi)$	$\vee!$	$\pi' : \neg\pi[\overline{F}(\pi)/\overline{F}(\pi)]$	

In order to arrive from this representation to a particular contrast interpretation, additional information has to be considered, namely the contextual parameters position, accent and discourse structure. This information specifies the particular uses and interpretations of *aber* and *doch*. Here I can only hint at what formal ingredients are needed to build up a semantic representation of discourses with *aber* and *doch*. First of all, the representation of the clauses must include information about their information structure: contrastive topics, focus, verum focus, and background. Recent developments in DRT such as Kamp (2004) provide means for representing the information structure of sentences in discourse, at least with respect to focus and background. And second, the discourse representation must contain information about the discourse structure, i.e. whether we deal with coordination or implicit/explicit denials. This information could be partly provided by SDRT glue logic axioms used to identify the rhetorical relation between two clauses in discourse (Asher and Lascarides (2003)). For the disambiguation of the different positional and prosodic variants which is specifically relevant for *doch*, DRT construction rules can be specified that will guide the construction of the semantic representation from the syntactic form and the focus-background articulation of the clauses, much in the way proposed in Riester (2005) where the compositional semantic system of Bottom-Up DRT (Kamp et al. (2004)) is augmented by semantic-syntactic constraints by means of which syntactic constituents are marked as being part of the focus or the background of the sentence. Thus disambiguation will be guided by the construction rules, as well as by information contained in the partially built (S)DRS about the discourse structure and the information structure of the conjuncts.

7 Conclusion

In this paper, I proposed an unifying account of the two major German adversative connectors *aber* and *doch* based on a generalisation of Sæbø's contrast presupposition over various contextual parameters involving information structure, discourse structure and the syntactic position and prosody of the connectors. I suggested that an underspecified representation of the meaning of these connectors, complemented by a procedure for selecting the adequate reading in the particular context, accounts for the similarities and differences in the various interpretations of these polyfunctional words. The details of the suggested disambiguation algorithm are being worked out in ongoing research.

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Infinitival Complements *

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Abstract

Kusumoto (2005) argues against a scope analysis of tense in a Priorian system and for one where explicit tense variables appear in the object language of semantic analysis. She bases her argument partly on sentences where a verb in a relative clause is interpreted at a later time than the matrix verb, even though the relative clause occurs in a Determiner Phrase trapped below tense by an Negative Polarity Item. However, Kusumoto admits that her system alone does not explain the generalization noticed by Abusch (1988) that later-than-matrix readings for transitive intensional verbs correlate with *de re* readings of their objects. This paper argues for a version of the scope analysis of tense that accounts for both the Abusch and the Kusumoto facts, as well some new evidence that does not easily fit into an explicit tense variable system.

1 Problem

Kamp (1971) and Cresswell (1990) (among others), note that sentences like (1) have two readings:

(1) Hillary married a man who became the president of the U.S. (=Kusumoto's 21)

(2) Earlier than Matrix: *Election* *Marriage* *Now*

(3) Later than Matrix: *Marriage* *Election* *Now*

The reading represented in (2) is one where the man in question became president before Hillary married him. The reading represented in (3), which Kusumoto (2005)

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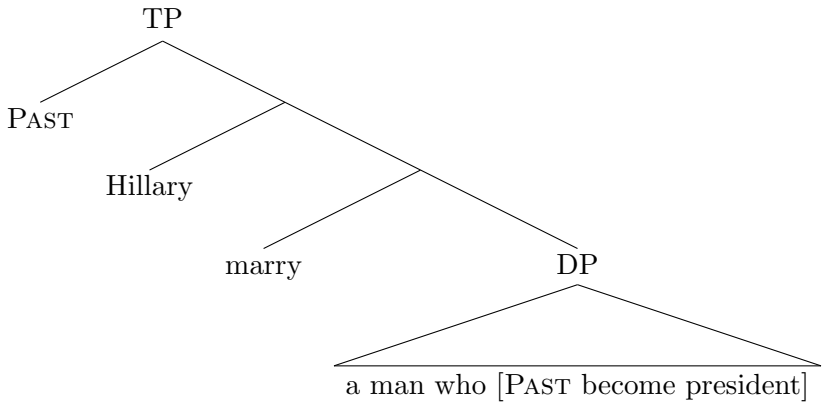
Grønn, Atle (ed.): *Proceedings of SuB12*, Oslo: ILOS 2008 (ISBN 978-82-92800-00-3), 303–317.

calls the "later-than-matrix" interpretation, is where the man became president after Hillary married him.

This latter reading ostensibly poses a problem for a Priorian tense system, given (for instance) the following definition of a past tense operator and LF for (1):

(4) $[\![\textsc{Past}\ \phi]\!]^t = 1$ iff $\exists t' \prec t : [\![\phi]\!]^{t'} = 1$.
(The evaluation time for ϕ precedes the evaluation time for PAST ϕ.)

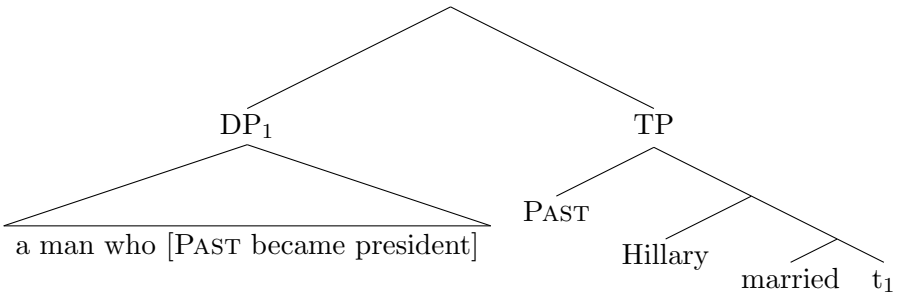
(5)



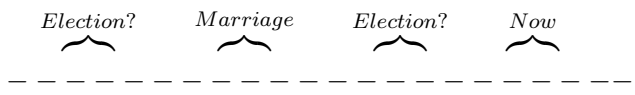
The first instance of PAST sets the evaluation time for *Hillary marry a man who* PAST *become president* to an interval, call it t, before the utterance time. The second instance of PAST shifts the interval for *become president* to an interval before t. Therefore, only the reading in (2) should be available, contrary to fact.[1]

Consequently, proponents of the Priorian system (Ladusaw, 1977; Ogihara, 1996; Stowell, 1993) have analyzed later-than-matrix interpretations as involving an LF in which the object DP raises to a position above the matrix past tense where it is evaluated with respect to the speech time. Kusumoto calls this the "scope analysis":

(6)



(7) Independent:



[1]Note that this is different from a traditional Sequence of Tense case because the two events are not simultaneous; their relative order is simply underdetermined.

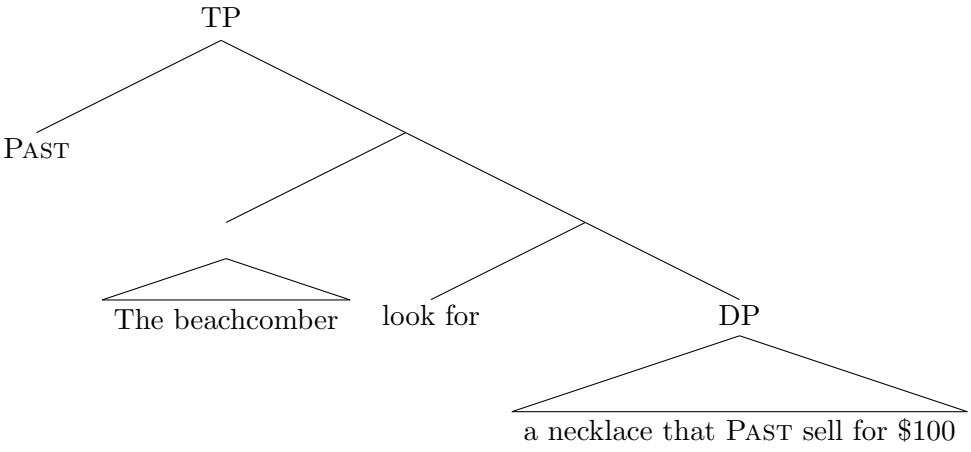
In (6), the evaluation time for DP_1 is independent from that for TP, although both must be before the utterance time, as illustrated in (7).

Some evidence for this approach comes from Abusch (1988), who points out that the temporal interpretation of certain relative clauses in intensional contexts correlates with whether the object DP containing the relative clause is interpreted *de re* or *de dicto*:

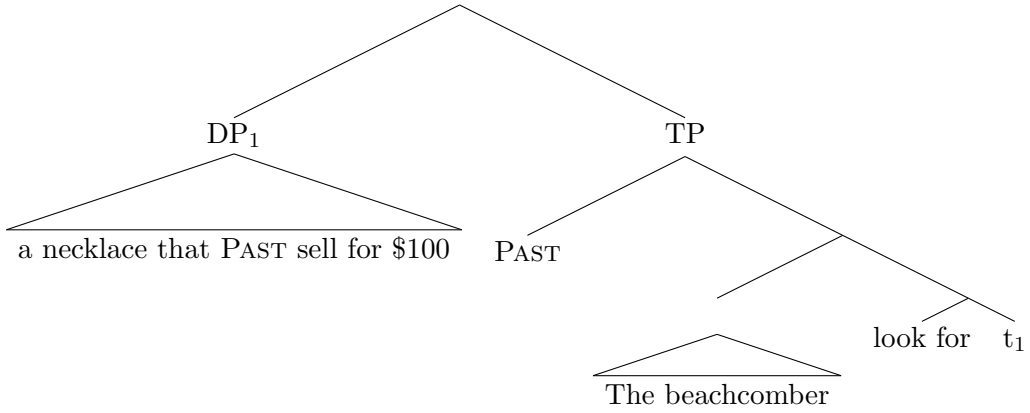
(8) The beachcomber was looking for a necklace that sold for more than $100.

If the DP headed by *a necklace* is interpreted *de dicto* – i.e., the beachcomber was looking for any necklace that sold for more than $100 – the selling must have taken place before the looking. This fact is explained nicely in a Priorian system, assuming that the *de re* reading arises from a structure where the object DP raises above the intensional verb (and hence potentially above the PAST operator), and the *de dicto* reading from a structure where the DP remains in situ (and hence below the PAST operator):

(9) *De dicto*: selling $\prec$ looking



(10) *De re*: selling $\rightleftarrows$ looking

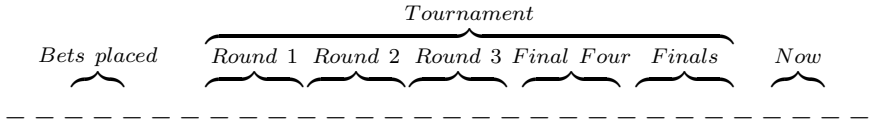


However, despite this evidence, Kusumoto (2005) argues against the scope analysis. She points out that even some sentences where the DP is "trapped" below the matrix verb by a Negative Polarity Item in fact have a later-than-matrix reading.

To illustrate these sentences, consider the NCAA basketball "March Madness" tournament and the betting pools concerning this tournament. The way such betting proceeds is that you must choose a winner for every game in every round before the tournament begins. So, if there are four teams – call them A, B, C, and D –, you might choose A to beat B and C to beat D in round one, and choose A to beat C in round two. The second-to-last round of the tournament is called the "Final Four," since there are four teams left. Now, let us say that I placed such a bet before the tournament began. After the tournament, I can say:

(11) I failed to pick any team that made the final four. (≈ Kusumoto's 24b)

(12) I managed not to pick any team that lost in the first round.

(13)


Both of these sentences sound fine, even though the NPI *any team* should presumably prevent the object DP from raising as needed in the scope analysis. Based partly on this evidence, Kusumoto argues against the Priorian system and for one where explicit tense variables appear in the object language of semantic analysis. However, she admits that her system alone does not explain the generalization noticed by Abusch (1988). In the remainder of this paper, I argue for a version of the scope analysis that accounts for both the Abusch and the Kusumoto facts, as well some new evidence that does not easily fit into an explicit tense variable system.

2 Implicatives

Notice that the verbs Kusumoto chooses are both implicative verbs[2], so named by Karttunen (1971):

(14) (≈ Karttunen's 2)

a. IMPLICATIVE: manage, remember, bother, get, dare, care, venture, condescend, happen, see fit, be careful, have the misfortune/sense, take the time/opportunity/trouble, take it upon oneself, fail.

[2]Kusumoto also has an example with "try," a non-implicative verb, but I have not found any native speaker that can get the later-than-matrix reading for examples like the following:

(i) I tried not to pick any team that lost in the first round.

b. NON-IMPLICATIVE: agree, decide, want, hope, promise, plan, intend, try, be likely, be eager/ready, have in mind.

Implicative verbs presuppose some sort of modal statement about their complements and assert the truth of falsity of that complement:[3]

(15) John managed to solve the problem. ⇒
a. John tried to solve the problem. [presupposition]
b. John solved the problem [assertion]

(16) John didn't manage to solve the problem. ⇒
a. John tried to solve the problem. [presupposition]
b. John didn't solve the problem [assertion]

The fact that the modal portion of the meaning (given in the (a) sentences above) survives negation is evidence that this portion of the meaning is presupposed; the rest of the meaning (given in the (b) sentences) does not survive negation.

Furthermore, unlike non-implicative verbs, the assertion about the complement of an implicative verb seems to occur at a time at least linked to the time of the matrix sentence:

(17) (based on Karttunen section 5)
a. Yesterday, John hoped to solve the problem next week.
b. *Yesterday, John managed to solve the problem next week.

This is why these verbs work well for Kusumoto's purposes; there is a larger structure that allows intermediate positions for negation, but the tense is still linked between the higher and lower clauses. Last, note that only a subset of the implicative verbs (as shown in (19)) allow later-than-matrix interpretations of relative clauses, and no non-implicative verbs (as shown in (20)) do so:

(18) I managed/happened/had the fortune not to pick any team that lost in the first round.

(19) #I remembered/dared/condescended/saw fit/etc. not to pick any team that lost in the first round.

(20) #I agreed/decided/planned/promised/etc. not to pick any team that lost in the first round.

The implicative verbs that do work seem to be those that are perhaps slightly less agentive: *manage*, *happen*, *have the misfortune/fortune*, and *fail*. So, examples like

[3]This view of the presuppositions of implicatives is different from Karttunen's.

those Kusumoto gives only work with a handful of verbs: less agentive implicatives.

3 Aspect

I assume in what follows that all verbs, even infinitives, have aspect, like perfective or imperfective. In a language like Czech, aspect on infinitives even shows up overtly[4]:

(21) Včera jsem dokázala vyřešit ten problém.
yesterday Aux-1sg. managed to solve.PRF the problem
'I managed to solve the problem yesterday.'

(22) Dokázala jsem řešit ten problém, když Jan přišel na návšťěvu.
managed Aux-1sg to-solve.IMPRF the problem when Jan came on visit.
'I managed to be solving the problem when Jan came by.'

(23) Dokázal jsem poskakovat hodinu.
managed Aux-1sg hop.ITER-IMPERF hour
'I managed to hop for an hour.'

Even though all the verbs in the three complement sentences above are infinitives, and all appear under the verb *manage*, they exhibit three different markings for aspect. The verb *vyřešit* 'to solve,' appears in the perfective and imperfective above; *poskakovat* 'to hop,' appears in the imperfective iterative.

In the implicative examples examined in this proposal, there is perfective aspect on the infinitives in the complement clauses:

(24) $[\![\text{PRF } \phi]\!]^t = \exists t' \subset t : [\![\phi]\!]^{t'}$.
(The evaluation time for ϕ is a subinterval of the evaluation time for PRF ϕ.)

(25) a. PAST I managed PRF to finish the test.
b. There is a time interval t in the past such that there is a time interval $t' \subseteq t$ such that I finished the test in t'.

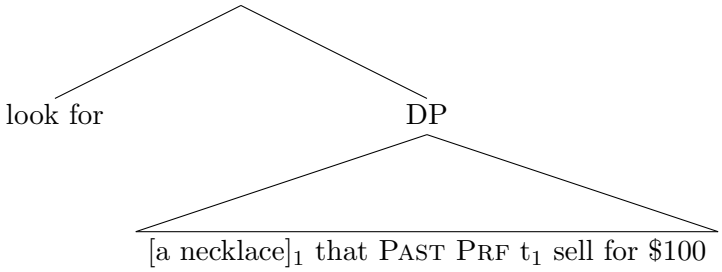
Under this definition, the action in the complement happens at a subinterval of the interval in which the matrix sentence occurs. As we will see below, this creates an extra scope position for sentences with implicatives.

[4]Thanks to Ivona Kučerová for these examples.

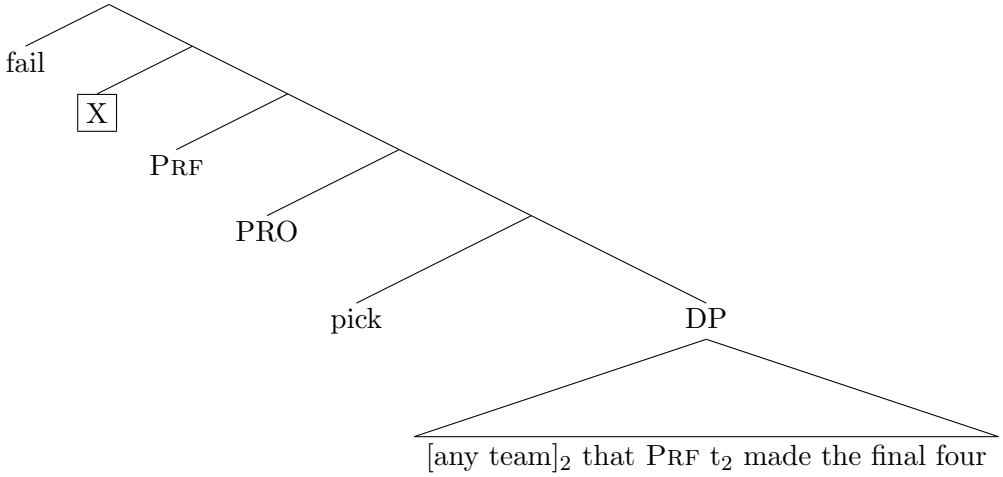
4 Proposal

The crux of the issue examined in this paper is deciding what the difference is between the Abusch-style example in (8), partly represented in (26), and the Kusumoto-style example in (11), partly represented in (27). I propose that the difference is that (27) has an extra scope position between the verb and the potentially later-than-matrix DP, marked with an *X* below[5]:

(26)



(27)



Since *look for* does not take an infinitival complement, there is no aspect and hence no position to raise the object above this aspect. Complements to implicative verbs such as *fail*, on the other hand, do have such a position, as described in the previous section.

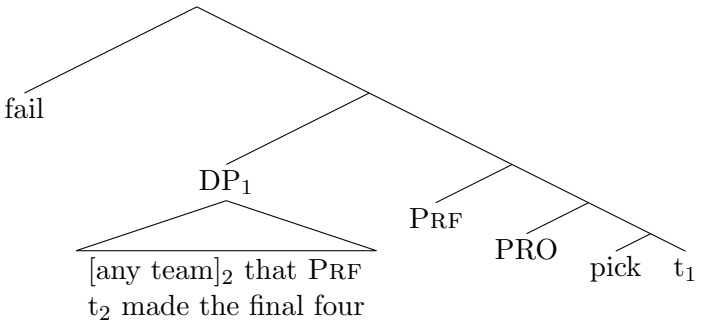
The highest occurrence of PRF in (27) sets the evaluation interval for everything below it to a time interval t within the matrix time interval. The relative clause *made the final four*, when it scopes in situ, as shown in (27), will occur at a subinterval of the time of picking, t; but this is almost impossible, since picking is almost instantaneous.[6] However, if the DP scopes in the position marked X, the time interval for the relative clause may differ from that of the infinitive *to pick*, even though the DP remains below

[5]There is no tense in (27) because I assume that, under this reading, the past tense on *sold* and *made* is purely due to sequence of tense (Abusch, 1988; Ogihara, 1996; Stowell, 1993) and carries no actual meaning of anteriority.

[6]One possibility is that the earlier-than-matrix reading of (11) involves actual past tense on the relative clause, instead of sequence-of-tense past-tense marking.

the matrix verb and hence is able to contain an NPI:

(28)



Here the relative clause is outside the scope of the perfective aspect on the infinitive *to pick*, and hence only has to occur within the matrix time interval.

Given this analysis, and ignoring the presuppositional meaning, the assertion of (11), repeated as (29) comes out as follows:

(29) I failed to pick any team that made the final four.

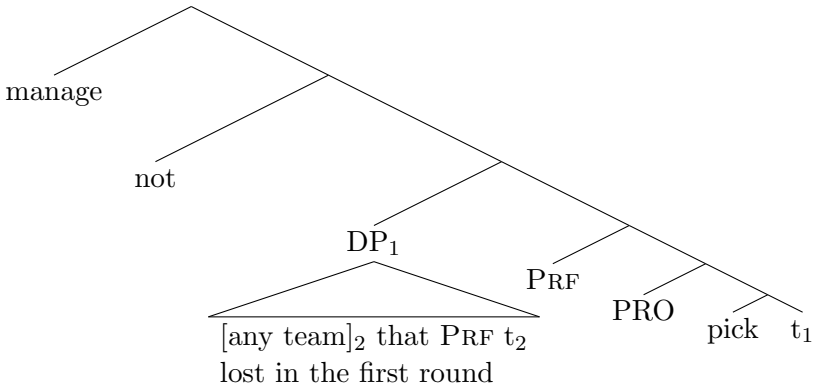
(30) $[\![\textbf{fail}\ \phi]\!]^t = \lambda x \in D_e : x \text{ tries } \phi\ .\ [\![\phi]\!]^t = 0.$

(31) There is a time interval t in the past and it is not the case that there is a team x such that there is an interval $t' \subset t$ in which x makes the final four and an interval $t'' \subset t$ in which I picked x.

Under this meaning, the relationship between the time of the picking and the time of the making the final four is unspecified, and therefore the later-than-matrix interpretation is possible. Similarly:

(32) I managed not to pick any team that lost in the first round.

(33)



(34) $[\![\textbf{manage}\ \phi]\!]^t = \lambda x \in D_e : x \text{ tries } \phi\ .\ [\![\phi]\!]^t = 1.$

(35) There is a time interval t in the past and it is not the case that there is a team x such that there is an interval $t' \subset t$ in which x loses in the first round and an interval $t'' \subset t$ in which I picked x.

This proposal, like Kusumoto's, derives the facts in (11) and (12). Unlike Kusumoto's, however, my proposal allows us to maintain a scope analysis for (8), since in such sentences there is no intermediate position for the object DP to land.

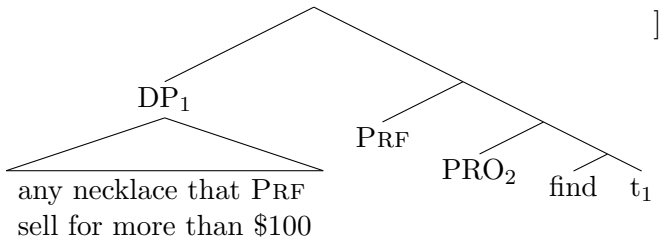
5 Further Predictions

5.1 (Not Quite) A Minimal Pair to the Abusch Example

Sentences very similar to (8), but differing in having infinitival complements, do allow the later-than-matrix interpretation, even with an NPI:

(36) The beachcomber failed to find any necklace that sold for more than $100.

This example is similar to the *de dicto* reading of (8), in that the object DP theoretically must be below the matrix verb *fail*, due to the NPI *any*. Here, however, the selling actually can be after the finding. I submit that this reading is made possible by the extra scope position provided by the infinitive in (36), as illustrated below:

(37) [[The beachcomber]$_2$ failed 

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5.2 Different Time Intervals

My proposal suggests that the time interval for the matrix sentence might differ from the time interval for the infinitival complement, and certain data seem to back this up:

(38) Before Duke won yesterday, I had failed to pick a single team that made the third round.

(39) #Before the tournament began, I had failed to pick a single team that made the third round.

To analyze these sentences, consider the following definitions, adapted from von Fintel and Iatridou (2002):

(40) $[\![\textsc{Past}\ \phi]\!]^t = 1$ iff $\exists t' \prec t : [\![\phi]\!]^{t'} = 1$.

(41) $[\![\textsc{Prf}\ \phi]\!]^t = 1$ iff $\exists t' \subseteq t : [\![\phi]\!]^{t'} = 1$.

(42) $[\![\textsc{Perf}\ \phi]\!]^t = 1$ iff $\exists t' : RB(t, t')$ and $[\![\phi]\!]^{t'} = 1$.
(The evaluation time ϕ is an interval whose right boundary is the evaluation time of $\textsc{Perf}\ \phi$.)

(43) $RB(t, t')$ – t is the Right Boundary of t' – iff $t \cap t' \neq \emptyset$ and $\exists t'' \subseteq t : t' \preceq t''$.

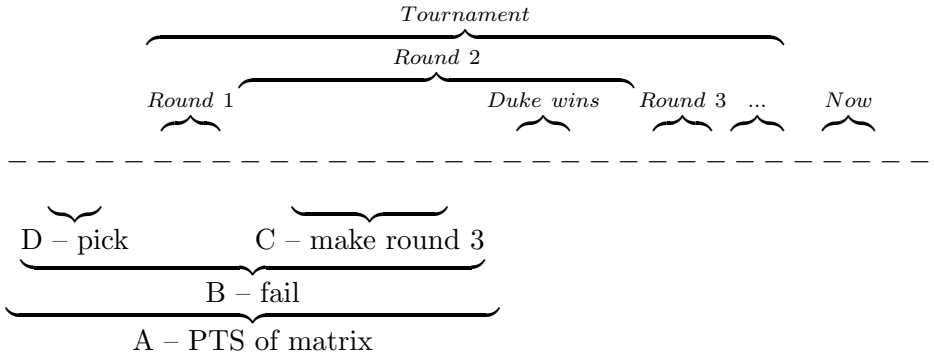
(44) $[\![\textbf{fail}\ \phi]\!]^t = \lambda x \in D_e : x$ tries ϕ . $\neg[\![\phi]\!]^t$.

(45) $[\![\textbf{Before}\ \psi\ \phi]\!]^t = 1$ iff $RB(\textit{time-of}(\psi), t)$ and $[\![\phi]\!]^t = 1$.

The LF for (38) is as follows, as well as a timeline representation of the events as necessitated by the meanings given above:

(46) [Past [Perf [$_A$ Before Duke won,
[Prf [$_B$ I$_1$ fail
[a single team [Prf [$_C$ that make the third round]]]$_2$
[Prf [$_D$ PRO_1 pick t_2]]
]]
]]]

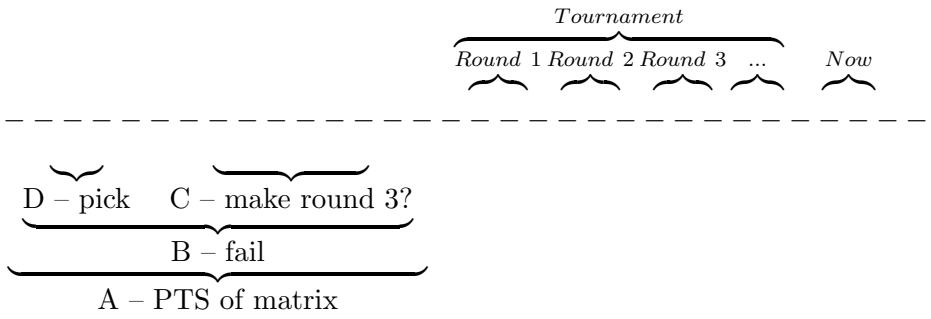
(47)



This sentence sounds fine, since the failing is entirely before the time at which Duke won. Not so, however, for (39):

(48) [Past [Perf [$_A$ Before the tournament began,
[Prf [$_B$ I$_1$ fail
[a single team [Prf [$_C$ that make the third round]]]$_2$
[Prf [$_D$ PRO_1 pick t_2]]
]]
]]]

(49)

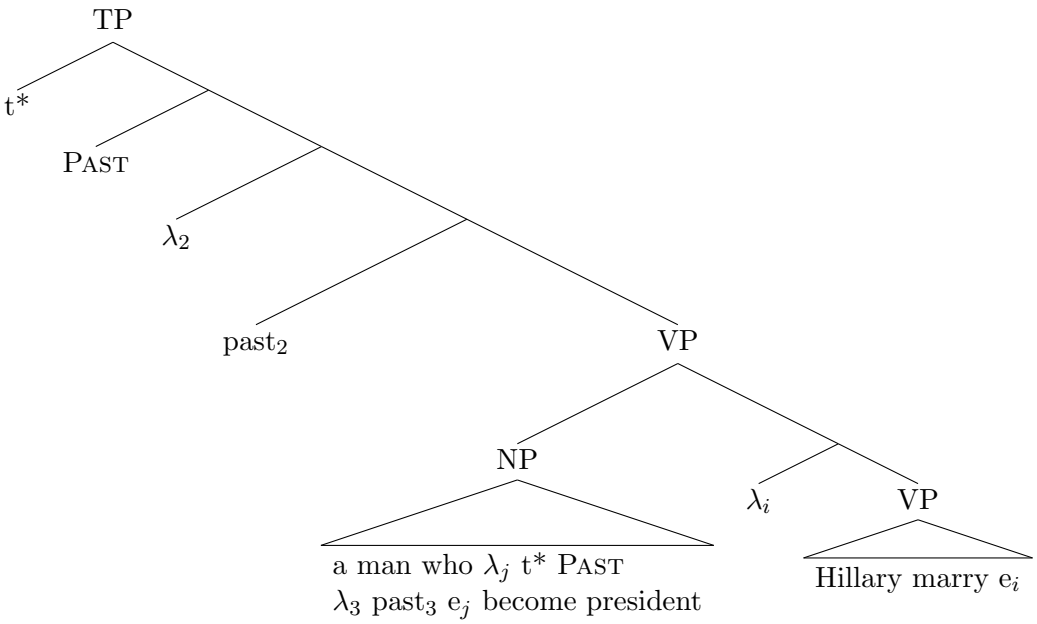


I submit that the oddity of (39) is due to the fact that although the picking happened before the tournament began, the teams to make the third round were not determined at that point, and therefore (before the tournament) the speaker has not *yet* failed to pick any team that made the third round. So, the picking and the failing can occur at different intervals.

5.3 Kusumoto's Analysis

Kusumoto's structure for a later-than-matrix reading is as follows:

(50)



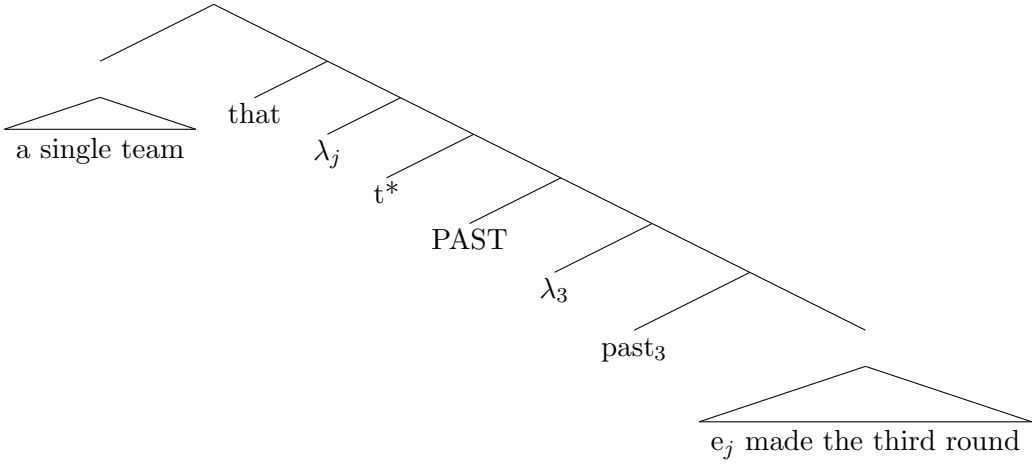
(51) $[\![\textbf{t*}]\!]^g$ = the speech time provided by the context.
(Indexical referring to now)

(52) $[\![\text{PAST}]\!]^g = \lambda P \in D_{ist}[\lambda t \in D_i[\lambda w \in D_s[$ there is a time t' such that t' $\prec$ t and that P(t')(w) =1]]]
(Higher type PAST operator)

(53) $[\![\textbf{past}_n]\!]^g = g(n)$
(Explicit time variable)

In her system, verbs take an explicit time variable as one of their arguments, so *marry* takes $past_2$ and *become president* takes $past_3$ above. Therefore, she would posit the following structure for the DP in (39):

(54)



Since the t* does not depend on anything above it but rather always picks the utterance, (54) should yield a fine interpretation for (39); it is unclear, then, how Kusumoto would rule (39) out.

5.4 VP-Internal NPIs

Last, notice that when an NPI is trapped inside a VP, the later-than-matrix reading is disallowed:

(55) a. I sent some letters to someone who wrote me back the next day.
b. I sent no letters to anyone who insulted me.
c. # I sent no letters to anyone who replied the next day.

A later-than-matrix interpretation is acceptable in (55-a) and an NPI without a later-than-matrix interpretation is acceptable in (55-b), but an NPI may not have a later-than-matrix interpretation, ruling out (55-c). I argue that this is due to the fact that the NPI may not raise out the VP to receive interpretation outside of the matrix tense. But embedding the sentence as an infinitival clause does not improve it this time:

(56) # I managed to send no letters to anyone who replied the next day.

(56) still lacks the later-than-matrix interpretation. This is compatible with my proposal that an infinitival clause allows the later-than-matrix interpretation by providing an

extra scope position above the infinitive. In (56), the object DP cannot even raise to this scope position and therefore the interpretation is prevented. This also is unaccounted for in a Kusumoto-style analysis.

6 Remaining Issues

6.1 Other Adverbials

The implicatives that allow later-than-matrix readings are split with respect to taking adverbials that target the main verb of the complement:

(57) This year / #On March 1st, I had the good fortune not to pick any team that lost in the first round.

(58) This year / #On March 1st, I happened not to pick any team that lost in the first round.

(59) This year / On March 1st, I managed not to pick any team that lost in the first round.

(59) seems to have two readings: first, a reading where *on March 1st* is part of the presupposition of *manage* ("Even way back on March 1st...") and second, a reading where *on March 1st* contrasts with another date ("On March 1st, ...; on March 2nd, ..."). So, it seems as though in some limited cases, adverbials at the beginning of the sentence can be interpreted low in the structure. Having a perfect, as the examples in section 5.2 do, seems to force the adverbial to apply to the higher structure.

6.2 Other Verbs with Infinitival Complements

Other implicatives cannot take the later-than-matrix reading:

(60) #I forgot to pick any team that made the final four.

(61) #I was careful not to pick any team that lost in the first round.

This will require further work to explicate completely, but my feeling is that it is the presupposition of these (more agentive) implicatives that preclude the reading. For instance, *be careful* requires that whether you accomplish the action in its complement is entirely within your power.

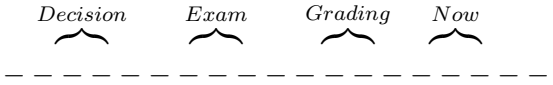
Non-implicatives often shift the time of their complements forward, as seen above:

(62) Yesterday, John hoped to solve the problem next week.

When the time of the relative clause is after the time of the main verb of the infinitival complement, such a sentence is good even if the relative clause's verb occurs after the matrix verb:

(63) Yesterday, I decided not to give an 'A' to any student who failed next week's exam.

(64) l-t-m but earlier than infinitive:



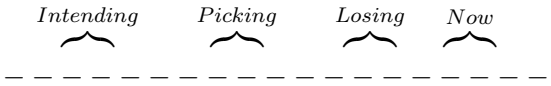
However, for many of these verbs, the relative clause cannot be later than the infinitive:

(65) #I agreed/decided/planned not to pick any team that lost in the first round.

I believe that this is for the same reason as the rest of the implicatives. Verbs such as *decide* carry a presupposition that the decision is in your power. Still, some non-implicatives do seem to allow a later-than-infinitive interpretation:

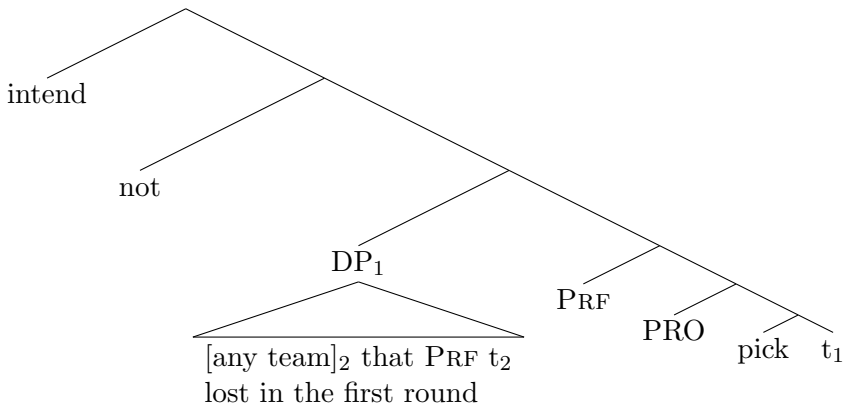
(66) ?I intended not to pick any team that lost in the first round (... but things didn't work out the way I wanted).

(67) later than infinitive:



To the extent that such verbs are good, I presume that they do not have any presuppositions that preclude such a reading, and they allow a similar structure to that of the later-than-matrix implicatives:

(68)



7 Conclusion

In this paper, I have demonstrated that at least one type of example that Kusumoto (2005) uses to argue against scope theories of tense should be reexamined. She claims to show sentences with later-than-matrix readings in relative clauses trapped below tense by a negative polarity item. I have suggested an analysis where such readings are not, strictly speaking, later-than-matrix; but rather more accurately independent-from-complement tense. I posited a scope position below matrix tense and negation, but above perfective aspect on the complement infinitive. From this position, verbs in a DP's relative clause may be evaluated at a time interval independent from the main tense of the infinitival complement clause. This analysis maintains Abusch's (1988) analysis of transitive intensional verbs, since such sentences lack the extra scope position present in the implicative sentences. Last, the proposal in this paper explains certain further facts that are troublesome for Kusumoto's theory, involving different times of evaluation for an implicative verb and its complement and involving VP-internal NPIs.

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On an Analogy between English Nominal and Polish Aspectual Manifestations of Genericity*

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Abstract

The main goal of this study is to prove that two modal mechanisms Greenberg (2003) postulated for English indefinite singular (IS) and bare plural (BP) generics in the nominal domain are mirrored in Polish perfective and imperfective generics in the event domain. On the basis of Oosterhof's (2006) argumentation, I justify the distinction between the GEN and the HAB intensional operators. With this distinction in mind, I associate the combination of HAB+perfective aspect as exemplifying the same kind of an 'in virtue of' modality as Greenberg postulates for the combination of GEN+IS. In the same manner, I claim that both the combination of GEN+BP and the combination of HAB+imperfective aspect exemplify either 'descriptive' or 'in virtue of' modality.

1 Introduction

The main focus of the existing theories on genericity has been on the variation in the expression of generic meaning in the nominal domain in Germanic and Romance languages (Cohen 2001, Greenberg 2003, Oosterhof 2006, Farkas & De Swart 2007). It turns out that there is also a variation in the morpho-syntactic expression of genericity in the verbal domain in Polish in which there exist both perfective[1] and imperfective habituals, exemplified in (1)-(3) and (4)-(6) respectively.

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[1]Perfective habituals are particularly interesting since they constitute a problem for most theories which associate habituality with the inherent semantics of the imperfective aspect (cf. Bonomi 1995, Bhatt 1999, Lenci and Bertinetto 2000, Menéndez-Benito 2002, a.o.).

Grønn, Atle (ed.): *Proceedings of SuB12*, Oslo: ILOS 2008 (ISBN 978-82-92800-00-3), 318–336.

(1) Janek pocieszy w potrzebie.
Janek PERF-comfort-3SG in need.
'John will comfort you in need.'

(2) Julia nie wypije taniego wina.
Julia not PERF-drink-3SG cheap wine.
'Julia will not drink cheap wine.'

(3) Ortodoksyjna muzułmanka nie odsłoni twarzy przy posiłkach.
Orthodox muslim woman not PERF-uncover-3SG face during meals.
'An orthodox muslim woman will not uncover her face during meals.'

(4) Xiu pije mleko sojowe na śniadanie.
Xiu drinks-IMP-3SG milk soya for breakfast.
'Xiu drinks soya milk for breakfast.'

(5) Julia ubiera się na czerwono.
Julia wears- IMP-3SG REFL on red.
'John wears red clothes.'

(6) Wiewiórki jedzą orzechy.
Squirrels eat-IMP-3PL nuts.
'Squirrels eat nuts.'

Since everything in a language happens for a reason, a relevant question that arises is what semantic and pragmatic mechanisms underlie the observed surface aspectual variation in the expression of habituality in Polish. My understanding of this question has been significantly influenced by Greenberg's (2003) theory of English indefinite singular generics (IS-generics), presented in (7) and bare plural generics (BP-generics), shown in (8).

(7) a. A man does not cry.
b. A dog has four legs.
c. A friend helps in need.
d. A whale eats krill.

(8) a. Grizzly bears sleep in winter.
b. Squirrels eat nuts.
c. Norwegian fishermen use the best fishing equipment.
d. Women in this city care about their gardens.

Greenberg (2003) argues that IS and BP generics express different types of modal meanings. BP generics can express either 'descriptive' or 'in virtue of' modal meaning while IS generics can express only an 'in virtue of' modal meaning. A crucial hypothesis advocated in this study is that the two types of modal mechanisms Greenberg postulated in the nominal domain for English IS/BP generics are mirrored in

Polish perfective/imperfective generics in the event domain. There are several major aspects which need to be established in the subsequent sections of this article to create a necessary background for a clear justification of this hypothesis. In section 2, I discuss Greenberg's 'in virtue of' and descriptive modal mechanisms underlying IS/BP generics in English. In section 3, on the basis of Oosterhof's (2006) argumentation, I justify a distinction between generalizations over individuals and generalizations over eventualities headed by the respective GEN and HAB intensional operators and I incorporate this distinction into Greenberg's formulas which enables me to treat descriptive and 'in virtue of' modal mechanisms as underlying both the Gen and/or the Hab operator. In section 4, I provide arguments for my main hypothesis that 'in virtue of' and descriptive modal mechanisms Greenberg postulated for IS and BP generics in English in the nominal domain also underlie imperfective/perfective generalizations in Polish in the event domain and I develop the semantics of perfective and imperfective habituals with referential subjects.

2 Greenberg's (2003) theory of IS and BP generics in English

It is traditionally assumed that IS generics and BP generics are synonymous and that their semantics can be represented in a uniform fashion as a tripartite structure headed by the modal Gen operator. As for the semantics of the Gen, it is a common claim in e.g. Dahl (1975), Wilkinson (1991), Chierchia (1995), Krifka (1995) that it is universal and modalized i.e. that it universally quantifies not only over individuals and situations, but also over possible worlds, restricted by some sort of an accessibility relation. The common underlying representation Greenberg adopts for IS and BP generics is given in (9):

(9) $\forall$ w' [[<u>w' is appropriately accessible from w</u>] $\rightarrow$ $\forall$ x,s [[grizzly bear (x,w') and C (s,x,w')] $\rightarrow$ [snore loudly (s,x,w')]]]

Paraphrase: in all w' appropriately accessible from the world of evaluation w, every grizzly bear, in any contextually relevant situation (e.g. every sleeping situation) is snoring loudly.

Greenberg claims that the uniform representation accounts for the fact that both types of sentences express nonaccidental genericity but it cannot account for a number of differences between them. She highlights a number of semantic, pragmatic and distributional differences between IS and BP generics in order to motivate the need for a non-uniform semantic treatment of these two surface manifestations of genericity and she proposes such an alternative account. She adopts the same underlying semantic representation for IS and BP generics but she claims that they differ in the type of modality involved, or in other words the type of accessibility relation restricting the Gen. The difference between IS and BP generics lies in the underlined part of the formula in (9), namely in determining which worlds (w') are appropriately accessible

from the evaluation world. Greenberg advances the hypothesis that BP generics involve the descriptive or the 'in virtue of' accessibility relation while IS generics involve only the 'in virtue of' accessibility relation. The difference between descriptive and 'in virtue of' generics is discussed in sections 2.1 and 2.2 respectively.

2.1 Descriptive modality in English BP generics

Descriptive generalizations are made on the basis of a number of actual instances which allow us to conclude that there is some pattern or more specifically that the generalization is not limited to the actual instances of individuals only (cf. Carlson 1995). Greenberg gives a suggestive illustration of the circumstances in which descriptive generalizations like *Boys don't cry* can be asserted. Let us imagine a scenario in which an alien from Mars visits our planet and watches the behavior of children and after observing many boys in several 'tear inducing situations', the alien decides there is some pattern about boys namely boys do not cry. In other words, the alien concludes that what he observes about boys is not accidental i.e. not limited to the actual instances of boys. Kratzer (1981) and Krifka et al. (1995) suggest that generic statements are modalized that is they hold in a set of accessible worlds. Greenberg (2003) suggests that descriptive generalizations hold in the set of worlds which are maximally similar to the actual world. Which worlds are these accessible worlds? Specifically, which aspects of the actual world are copied into them? Let us focus on Greenberg's formal analysis of the accessibility relation involved in descriptive generalizations. Greenberg assumes that a present tense descriptive BP sentence entails that the universal statement holds in all the inertia worlds to <w,I> at a larger time interval containing both the past and the future intervals, as formally represented in (10), and in all worlds which are inertia worlds to Lewisian worlds at the present at some interval surrounding the present interval I, as presented in (11):

(10) All inertia worlds to <w,I> at I' where I $\subset$ I' (i.e. where I is the present interval, and a proper subinterval of I')

(11) All inertia worlds to <$w_{Lewisian}$,I> at I', where I $\subset$ I' (i.e. where I is a proper subinterval of I')

Inertia worlds are defined in (12) as in Dowty (1979:149):

(12) w' $\in$ inr (<I,w>) iff w is a member of the set of worlds which are exactly like w until I (including I) and in which the course of events in I', the interval continuing I, develops in ways most compatible with normal course of events until I.

In other words, inertia worlds are those worlds where things take their normal course of events and nothing unexpected happens w.r.t. the actual world in the present. On the other hand, $w_{Lewisian}$ is a world maximally similar to w except from what is needed to allow for the fact that the P set of individuals and the set of relevant situations are not

identical to the set of P individuals and relevant situations existing in w, respectively. In order to combine the two requirements introduced in (10) and (11), Greenberg postulates a function Inrmax, presented in (13):

(13) Inrmax (<w,I>): {v: v ∈ inr <w,I> ∪ v ∈ inr <$w_{Lewisian}$,I>

Paraphrase: Inrmax is a function which takes world interval pairs and gives a set of worlds as a value. This set is a union of the worlds which are inertia worlds to <w,I> and those which are inertia worlds to <$w_{Lewisian}$, I> (i.e. inertia worlds to the worlds which are maximally similar to w, except for what is needed to allow for the fact that P set of individuals and the set of relevant situations are not identical to the set of P individuals and relevant situations existing in w, respectively.)

Apart from the semantic analysis of descriptive generalizations summarized above, Greenberg points out their two important pragmatic characteristics. Descriptive generalizations give rise to the presupposition of existence of individuals and relevant situations involving them of which the generalization is made. As a consequence, generalizations in (14)-(15) cannot be uttered if there are no existing relevant situations, or existing relevant individuals to support the generalization.

(14) #Tall members of this club have names ending with 't'.
(where this club was founded a week ago and no members are registered yet.)

(15) #Members of this club pay their taxes on time.
(where nobody has had to pay taxes yet) Greenberg (2003:162)

Additionally, Greenberg postulates the *enough*-presupposition of descriptive generalizations (triggered by Grice's maxim of quality). For instance descriptive generalizations in (16) and (17) are odd in scenarios (a) in which there are not enough relevant P individuals in relevant situations involving them.

(16) Green-covered books about the semantics of genericity contain no typos.
a. Only three such books have ever been published.
b. More than 100 such books have already been published.

(17) Jews in Nevada are tall.
a. There are only three Jews living in Nevada (and this is the average number of Jews before the present time as well)
b. There are 3000 Jews living in Nevada. Greenberg (2003:184)

2.2 'In virtue of' modality in English IS generics

Greenberg develops an intuition that IS sentences necessarily express what she calls 'in virtue of' generalizations. This means that an integral part of the meaning of these

sentences is having in mind some appropriately chosen property or aspect of our world, in virtue of which the generalization they express is true. The choice of this 'in virtue' of property is contextually constrained. Greenberg explains the nature of the 'in virtue of' accessibility relation in the following passage:

> 'The generic reading of IS sentences can only be obtained if the speaker has in mind, and the listener can accommodate, some relatively specific property associated with the property denoted by the IS subject, in virtue of which, or because of which, every member of the corresponding set has the predicated property. IS generics which express "in virtue of" generalizations are non-accidentally true in virtue of some property, associated with the subject property.' (Greenberg 2003:44)

For example *A boy does not cry* is intuitively evaluated in all worlds which are accessible from our world w.r.t. the property of *being a boy*. The set of these worlds is further restricted by the associated property ^S of boys in virtue of which they do no cry. Greenberg claims that a property ^S is associated with a property ^P in our world, iff we can find some modal base f, e.g. epistemic (what is known in w), deontic (what is required in w), legal (what the law provides), stereotypical (what the stereotypes in w say) such that in all the worlds accessible w.r.t. such a modal base f, it is true that $\forall x[P(x)] \rightarrow [S(x)]$. In this case the property which is associated with the set of boys is *being tough* which is clearly not true of all the boys in the actual world but rather of all the boys in all the worlds in which the western customs and stereotypes hold. Greenberg's definition of association is given in (18):

(18) ^S is associated with ^P in w iff there is a Kratzerian accessibility function *f* from worlds to sets of propositions (epistemic, deontic, stereotypical, legal, etc.) such that $\forall$w' [w' R_f w] $\rightarrow \forall$x [^P (x,w')] $\rightarrow$ [^S (x,w') and ^S $\in$ C]

Where ^S stands for an 'in virtue of' property, the IS subject denotes ^P, the VP denotes ^Q and C is a contextually determined set of properties of the subject set, w' R_f w stands for the worlds appropriately accessible from the evaluation world

Paraphrase: ^S is associated with ^P in w iff $\forall$x P(x)$\rightarrow$S(x) holds in all worlds epistemically accessible from w (where the facts known in w hold), or deontically accessible from w (where what is commanded in w holds), or stereotypically accessible from w - (where the stereotypes in w hold), etc. and ^S is a member of a certain contextually constrained set of properties C.

The truth conditions of IS sentences with the definition of association integrated is presented in (19):

(19) An IS sentence is true in w iff:
∃ ^S ∀w' ∀x [^P(x,w')] → [^S(x,w') and ^S is a member of a certain set of contextually determined properties C_1] → ∀ x,s [^P(x,w') and C_2(s,x,w')] → [Q(s,x,w')]

Paraphrase: An IS sentence is true in a world w iff there is a property ^S, s.t. in all worlds w', where every member of the subject set ^P has ^S, and furthermore, ^S is associated in w with the ^P property (given (18)), then every member of the subject set, in all relevant situations, is a member of the VP set ^Q as well.

3 A distinction between generalizations over individuals and generalizations over evntualities

As mentioned earlier in section 2, Greenberg (2003) assumes following Carlson (1989), Schubert and Pelletier (1989), Wilkinson (1991, 1995), Diesing (1992), Chierchia (1995), Kratzer (1995), Krifka et al. (1995) that generic contexts have the same underlying representation headed by the Gen operator which is a non-overt unselective universal quantifier over individuals, situations and worlds. I depart from this view and I assume instead that a distinction should be made between the Gen operator which intensionally binds individuals and the Hab operator which intensionally binds eventualities (cf. Oosterhof 2006 and Farkas & De Swart 2007). Hence, the representations of generic statements in (20 a,b,c) are given in (21 a,b,c).

(20) a. Children love Santa Claus. (generalization over individuals)
b. John smokes Camels. (generalization over eventualities)
c. Kangaroos jump high. (generalization over individuals and eventualities)

(21) a. ∀w' [(w' is appropriately accessible from w) → ∀x [child (x,w') → love SC (x,w')]]
b. ∀w' [(w' is appropriately accessible from w)→ ∀e [smoke (e,j,w') → smoke Camels (e,j,w')]
c. ∀w' [(w' is appropriately accessible from w) → ∀ x [kangaroo (x,w') → ∀e [jump (e,x,w') → jump high (e,x,w')]]]

Let me now justify the distinction between the Gen and the Hab by resorting to Oosterhof's (2006) two important arguments. The first argument is related to an asymmetry in aspect-sensitivity of generalizations over individuals and generalizations over eventualities. Only the latter ban the use of the progressive aspect under a generic interpretation, as shown in (22) and (23):

(22) a. Rotterdammers are watching TV (because Feyenoord is playing the Champions League final.)
b. In this season, hedgehogs are building up a reserve of fat.

(23) a. Luigi is drinking wine with his dinner. (implausible as generic)
b. Squirrels are eating nuts. (implausible as generic)

(Oosterhof 2006:10)

As observed by Oosterhof (2006), sentences in (22) receive a generic reading in the domain of individuals, even though they are expressed by means of the progressive aspect. In turn, generic sentences in (23) which express generalizations about eventualities cannot be expressed by means of the progressive aspect. The discussed contrast in aspect sensitivity of generalizations over individuals and generalizations over eventualities is a clear indication that they are distinct. Another argument in favor of the distinction between the GEN acting in the domain of individuals and the HAB acting in the domain of eventualities is related to the fact that in characterizing generic sentences two frequency adverbs can be used, as shown in a Dutch corpus example in (24):

(24) Amsterdammers gaan doorgaans meestal op de fiets naar hun werk.
Amsterdammers go generally mostly on the bike to their work
'Generally, Amsterdammers mostly go to work by bike.'

Oosterhof (2006:17)

Oosterhof suggests that in the most natural interpretations of these sentences, the first adverb corresponds to generalizations about objects, while the second expresses a generalization over eventualities. The two facts justify the distinction between the Gen intensionally binding individuals and the Hab intensionally binding eventualities. This distinction enables me to treat descriptive and 'in virtue of' modal accessibility relations as underlying both generalizations over individuals and/or generalizations over eventualities.

4 Descriptive and 'in virtue of' modality in IS/BP generics and in perfective/imperfective generics

In this section I intend to provide arguments for the core hypothesis advocated in this study which is that the two types of modal mechanisms Greenberg postulated in the nominal domain for English IS/BP generics are mirrored in Polish perfective/imperfective generics in the event domain. Let me first focus on an analogy between BP and imperfective generics which both involve descriptive modality.

4.1 Imperfective habituals as descriptive generalizations over eventualities

Descriptive generalizations are made on the basis of a number of actual instances which allow us to conclude that there is some pattern or more specifically that the generalization is not limited to the actual instances only. Greenberg focuses on descriptive generalizations over individuals. I intend to show that in a majority of cases imperfective habituals express descriptive generalizations over eventualities. Let us consider Scenario 1 which proves this assumption.

(25) a. *Scenario 1:* This summer I spent two months at my friend's house in Sichuan province in China. My friend's name is Xiu. There were so many cultural differences between my eating habits and the eating habits of Xiu. For instance, *Xiu eats meatballs and drinks soya milk for breakfast and she eats rice and seafood for dinner.*

b.

Xiu	je	kotleciki mięsne	i	pije	mleko sojowe
Xiu	eat-3SG-IMP	meatballs	and	drinks-3SG-IMP	milk soya
na śniadanie	a	na obiad	je	ryż	i owoce morza
for breakfast	and	for dinner	eat-3SG-IMP	rice	and seafood

'Xiu eats meatballs and drinks soya milk for breakfast and she eats rice and seafood for dinner.'

In this scenario we observe several actual instances of eventualities of Xiu's drinking soya milk and eating meatballs for breakfast and we generalize descriptively that what we observed is not limited to the actual instances of eventualities only. It follows straightforwardly from this that the descriptive accessibility relation underlies not only generalizations over individuals but also generalizations over eventualities. The truth conditions of the imperfective descriptive habitual sentence in (25b) are given in (26):

(26) $[\![$Xiu pije mleko sojowe (Xiu drinks-imp soya milk)$]\!]^{w,g}$ = 1 iff
$\forall w'$ [$(w' \subseteq \text{Inrmax}(<w,I>) \wedge C(w')) \rightarrow \forall e$ [drink sth for breakfast (e,Xiu,w') $\rightarrow$ drink soya milk for breakfast (e,Xiu,w')]]

Paraphrase: *Xiu drinks soya milk for breakfast* is true in w iff in all the worlds w' which are inertia worlds to <w,I> and those which are inertia worlds to $<w_{\text{Lewisian}}, I>$, all eventualities of Xiu's sth for breakfast in w' are eventualities of Xiu's drinking soya milk for breakfast in w'.

Descriptive generalizations over individuals and descriptive generalizations over eventualities are not only semantically but also pragmatically analogous. Descriptive generalizations over eventualities also trigger the presupposition of existence of relevant

eventualities. For instance, generalizations in (27) and (28) cannot be uttered if there are no actual eventualities which support the generalization.

(27) #Janek płaci podatek dochodowy na czas.
John pays-3SG-IMP tax income on time.
'John pays income tax on time.'
(where John has never paid any taxes on time)

(28) #Julia pije wino do obiadu.
Julia drinks-3SG-IMP wine for dinner.
'Julia drinks wine for dinner.'
(where Julia has never drank wine for dinner)

Additionally, not only descriptive generalizations over individuals, but also descriptive generalizations over eventualities give rise to the *enough*-presupposition (triggered by Grice's maxim of quality). Descriptive generalizations in (29) and (30) are unsuitable in scenarios (a) in which there are not enough relevant eventualities.

(29) Jan pali papierosy na balkonie.
Jan smoke-3SG-IMP cigarettes on balcony.
'John smokes on the balcony.'
a. John has smoked on the balcony only once in his life.
b. I've seen my neighbour John smoking on the balcony several times

(30) Maria nosi czerwone rzeczy.
Mary wear-3SG-IMP red clothes.
'Mary wears red clothes.'
a. I have seen Mary wearing red clothes only once so far.
b. I have seen Mary wearing red clothes several times on different occasions.

To sum up, it turns out that descriptive modality underlies not only generalizations over individuals but generalizations over eventualities as well. Apart from the analogy in the modality involved in descriptive generalizations over individuals and eventualities they share pragmatic chcracteristics. Both trigger the presupposition of existance and the 'enough' presupposition which together require that there exists a sufficient number of relevant actual instances of individuals or eventualities on which descriptive generalizations are based.

4.2 Perfective habituals as 'in virtue of' generalizations over eventualities

In this section, I intend to demonstrate that like English IS sentences in the nominal domain, perfective habituals express Greenberg-style 'in virtue of' generalizations in the event domain. In uttering a perfective generalization a speaker has in mind and a hearer needs to accommodate some background law-like evidence in virtue of which the

generalization is true. Let us consider the following perfective habituals in (31), (32) and (33):

(31) Janek pocieszy w potrzebie.
Janek PERF-comfort-3SG in need.
'John will comfort you in need.'

(32) Jarek podniesie nawet czołg.
Jarek PERF-lift-3SG even tank.
'Julia will not drink cheap wine.'

(33) Julia nie wypije taniego wina.
Julia not PERF-drink-3SG cheap wine.
'Julia will not drink cheap wine.'

The speaker of (31) most probably means that John will comfort you in need because he is very considerate of other people's problems. In uttering (32), the speaker means that Jarek will lift even a tank because he is so strong, in (33), the speaker may mean that Julia will not drink cheap wine because she has high culinary standards or because she is a lady and drinking cheap wine does not suit her nobel and courtly manners. Thus, there is a pragmatic/contextual factor which plays a systematic role in the interpretation of perfective habituals. Before I attempt to explain the pragmatic mechanism involved in the interpretation of perfective habituals along the lines of Greenberg's theory of 'in virtue of' modality, let me show several diagnostics which indicate that there are strong similarities between IS generics in English and perfective habituals in Polish. First of all like IS generics, perfective habituals seem to express a sort of 'in-principle' generalizations, with a strong level of law-likeness. They contrast with imperfective habituals which are ambiguous between the 'in-principle' reading and a reading expressing some 'in-reality' pattern. Greenberg observes that IS generics express 'normative' statements, as shown in (34). The same strong normative flavor can be observed in perfective habituals like the one in (35):

(34) A gentleman opens the door to a lady.

(35) Janek nie uderzy swojej żony kwiatkiem.
John not PERF-hit-3SG his wife flower-INSTR.
'John will not hit his wife with a flower.'

Second, Greenberg observes that IS generics with subjects expressing 'extremely unnatural properties' or with VPs denoting 'extremely unconnected properties' get an unexpected prominent existential reading as shown in (36). Similarly, a prominent episodic reading arises with perfective habituals in absurdous contexts, as shown in (37):

(36) a. A Norwegian student whose name ends with ‘s’ or ‘g’ wears thick green socks (a salient existential reading of the subject)
b. A carpenter in Amherst gives all his sons names ending with ‘a’ or ‘g.’ (a salient existential reading of the subject)
c. A famous semanticist sings German arias in the shower. (a salient existential reading of the subject) (Greenberg 2003:30-33)

(37) a. Dalan nie naprawi żonie samochodu.
Dalan not PERF-repair-3SG wife car.
‘Dalan will not repair his wife’s car.’
(a salient episodic reading)

b. Madonna posprząta w domu, ugotuje obiad
Madonna PERF-clean-3SG in house PERF-cook-3SG dinner
i zajmie się dziećmi.
and PERF-care-3SG REFL children.
‘Madonna will clean her house, cook dinner and look after children.’
(a salient episodic reading)

Greenberg claims that IS statements in (36) are infelicitous under a generic interpretation since it is impossible to find any ‘in virtue of‘ property which could be non-trivially associated with an IS subject. Similarly in perfective habituals in (37) context does not provide any background evidence from which the prejacent perfective proposition could be indirectly inferred. Interestingly, Greenberg observes that discourse can facilitate the generic interpretation of IS sentences, as presented in (38):

(38) a. There are very interesting traditions in Norway concerning clothing, professions and last names. For example, *a Norwegian student whose name ends with ‘s’ or ‘j’ wears thick green socks.*
b. The new health minister has bizarre salary criteria, for example, from now on, *a tall, left-handed, brown-haired neurologist from Canada earns $150,000 a year.*
c. Joshua Greenberg was a famous and admired carpenter in Amherst a hundred years ago. From that time until now *a carpenter in Amherst gives all his sons names ending with ‘a’ or ‘g.’*
(Greenberg 2003: 35)

Similarly, a proper context can rescue the habitual reading of perfective statements in (37), as shown in (39):

(39) a. Dalan ma dwie lewe ręce. *On nie naprawi swojej żonie samochodu. (glosses in 37a)*
‘Dalan is all thumbs. He will not repair his wife’s car.’

b. Jako dziennikarz, prowadziłem ostatnio wywiad z najlepszym przyjacielem. Madonny. Ujawnił kilka zaskakujących faktów o jej przyzwyczajeniach. Wszystkim nam się wydaje, że gwiazdy nie mają żadnych obowiązków domowych.
Okazuje się, że Madonna jest wyjątkiem. Jest bardzo samowystarczalna. *Sama posprząta w domu, ugotuje obiad i zajmie się dziećmi. (glosses in 37b)*
'As a journalist, I interviewed Madonna's best friend last week. He revealed some surprising facts about Madonna's habits. We all think that celebrities do not do any house chores. It turns out that Madonna is an exception. She is very self-reliant. She will clean her house, cook dinner and look after children.'

All italicized IS sentences in (38) are interpreted generically because context states explicitely that they follow from some local traditions or local payment regulations. In (39) all italicized perfective statements obtain a habitual reading, since context provides a background law-like proposition from which they can be indirectly inferred. These facts indicate that IS generics in English and perfective habituals in Polish are very similar. Both express 'in principle' rather than 'in reality' generalizations which are true 'in virtue of' some background evidence. Greenberg observes additionally that all IS sentences in (36) in which an IS subject gets a salient existential reading when uttered out of the blue become felicitous as generic with BP subjects, as shown in (40):

(40) a. Norwegian students whose name end with 's' or 'g' wear thick green socks
b. Carpenters in Amherst give all their sons names ending with 'a' or 'g.'
c. Famous semanticists sing German arias in the shower.
(Greenberg 2003: 30-33)

Similarly, all perfective statements in (37) in which perfective verbs get a prominent episodic reading become felicitous as generic when the verb has an imperfective aspectual form, as shown in (41):

(41) a. Dalan nie naprawia żonie samochodu.
Dalan not repair-3SG-IMP wife car.
'Dalan will not repair his wife's car.'
(a salient habitual reading)

b. Madonna sprząta w domu, gotuje obiad
Madonna clean-3SG-IMP in house cook-3SG-IMP dinner
i zajmuje się dziećmi.
and look after-3SG-IMP REFL children.
'Madonna cleans her house, cooks dinner and looks after children.'
(a salient habitual reading)

These facts indicate that there is a clear contrast between BP and IS generic sentences in that BP sentences can felicitously express bizarre generalizations, the felicity of IS sentences heavily depends on real world knowledge about norms, regulations, norms, traditions. The same holds for the contrast between imperfective and perfective habituals. Only imperfective habituals are felicitous under a generic interpretation in absurdous contexts while perfective ones express only those generalizations which follow from some background law-like evidence and which express what is generally considered reasonable in the actual world. These facts indicate that the 'in virtue of' modal mechanism does not only underlie generalizations over individuals taking the form of English IS generics or Polish count singular generics but it also underlies generalizations over eventualities taking the form of perfective habituals in Polish. This means that the 'in virtue of' accessibility relation restricts the set of worlds restricting the Hab operator in generalizations over eventualities. The truth conditions of 'in virtue of' habituals like for instance *Jan pocieszy cię w potrzebie* 'John will comfort you in need' are presented in (42):

(42) $[\![$ *Jan pocieszy cię w potrzebie (John perf-comfort you in need)* $]\!]^{w,g}$ = 1 iff
∀w' [(John has a high empathy in w') → ∀e [do sth when you are in need (e, John,w') → comfort you when you are in need (e, John,w')]]

Paraphrase: *Jan pocieszy cię w potrzebie (John perf-comfort you in need)* is true in a world w iff a speaker has in mind and a hearer accommodates a law-like proposition *John has a high empathy* s.t. in all worlds w' in which the law-like proposition *John has a high empathy* is true, all eventualities of John's doing sth when you are in need in w' are eventualities of John's comforting you in need in w'.

In other words, in order for perfective statements to be interpret as generic, a speaker needs to have in mind and a hearer needs to accommodate (tacitly add to the common ground) a law-like proposition which expresses an inherent property of the subject or some law-like aspect of the world in virtue of which the asserted perfective habitual statement is true. The accommodated law-like proposition updates the common ground by removing the worlds in which this proposition is false and by keeping the worlds in which this proposition is true and the worlds in which the accommodated proposition is true are also the worlds in which the asserted perfective statement is true (cf. Stalnaker 1968, 2002, Von Fintel 2006).

4.2.1 Perfective habituals as markers of an evidential mechanism of indirect inference

I this section I explain why there exist some habitual contexts for which it is possible to accommodate a background law-like evidence but which nevertheless can be expressed by means of the imperfective aspect only, as exemplified in (43).

(43) a. Krowa Mary daje mleko. (=felicitous as generic)
Cow-SG Mary give-3SG-IMP milk.
'Cow Mary gives milk.'

b. #Krowa Mary da mleko. (=infelicitous as generic)
Cow-SG Mary PERF-give-3SG milk.
'Cow Mary will give milk.'

c. Nasza kura Balbina znosi jajka. (=felicitous as generic)
Our hen Balbina lays eggs.
'Our hen lays eggs.'

d. #Nasza kura Balbina zniesie jajka (=infelicitous as generic)
Our hen Balbina PERF-lay-3SG eggs.
'Our hen lays eggs.'

In (43b) and (43d) one could potentially accommodate respective law-like propositions *Cow Mary has a milk-giving physionomy* and *Our hen Balbina has an egg-laying physionomy* and in principle the perfective forms in (43b) and (43d) should be felicitous as habitual. I suggest that there is an additional restriction on the use of perfective habituals. My claim is that perfective habituals serve as markers of an evidential mechanism of indirect inference. Habitual statements in (43a) and (43c) are statements of facts. They express propositions whose truth follows straightforwardly from the definition of the subjects, hence they do not need to be indirectly inferred from the law-like evidence. The contrast between habituals expressing statements of facts, of the type presented in (43) and habituals whose content is indirectly inferred from some background law-like evidence, of the type presented in (31-33) is reminiscent of the contrast between assertotic judgements and epistemic modal statements illustrated in (44) and (45):

(44) Looking out the window during our Arizona trip, I see pouring rain.
(DIRECT EVIDENCE)
a. It's raining.
b. #It must be raining.

(45) In a windowless conference room, I see people coming in folding up their wet umbrellas.
(INDIRECT EVIDENCE)
a. #It's raining.
b. It must be raining.

Von Fintel and Gillies (2007:1)

In (44) a speaker bases his statement on the direct evidence. He can see that it is raining and he asserts it. In spite of the fact that the truth conditions of an epistemic necessity modal *must* are satisifed, namely it is true that in all the worlds in which the evidence

holds (rain pouring behind the window) the prejacent proposition *It's raining* holds as well, it is impossible to use an epistemic modal in this scenario. In order to account for the contrast between assertions and epistemic modal statements in (44) and (45) Von Fintel and Gillies (2007) arrive at the generalization that epistemic modals are evidential markers i.e. they signal that the prejacent was reached through an indirect inference rather than on the basis of direct observation or trustworthy reports. They illustrate the process of indirect inference which underlies epistemic modal statements in (46):

(46) The ball is in A or in B or in C.
It is not in A. It is not in B.
So, it must be in C.

In (46) the conclusion is certainly correct and in principle the fact that the ball is in C could be expressed by means of an assertion but a speaker chooses the modal form since he wants to signal that he arrived at his conclusion through indirect inference. My explanation of the facts in (43) is that perfective habituals cannot be used to state obvious facts which follow directly from the definition of a subject, in the same way as epistemic necessity modals cannot be used to state facts which follow from some direct evidence, as in (44). In (43) we express a known fact which does not need to be inferred, hence the use of the perfective aspect would not serve its purposes of marking the evidential mechanisms of indirect inference.

5 Conclusions

In Greenberg's (2003) study of the semantics of IS and BP generics, the main claim is that they both express law-like generalizations over individuals but they differ in the accessibility relation restricting the Gen operator. Greenberg argues that BP generics involve the descriptive or the 'in virtue of' accessibility relation while IS generics involve only the 'in virtue of' accessibility relation. In this study I provided arguments showing that the two types of modal mechanisms Greenberg postulated in the nominal domain for English IS/BP generics also underlie Polish perfective/imperfective generics in the event domain. I first justified a distinction between generalizations over individuals headed by the Gen and generalizations over eventualities headed by the Hab and then I provided arguments showing that descriptive and 'in virtue of' modal mechanisms underlie not only generalizations over individuals but also generalizations over eventualities. One conclusion is that it is possible to make descriptive generalizations not only over individuals but also over eventualities i.e. after observing several actual instances of eventualities forming a certain pattern we can conclude that the series of recursive eventualities we observed is non-accidental. Apart from the analogy in the modality involved in descriptive generalizations over individuals and eventualities they share pragmatic characteristics. Both trigger the presupposition of existance and the 'enough' presupposition which together require that there exists a sufficient number of relevant actual instances of individuals or eventualities on which

descriptive generalizations are based. This means that the descriptive accessibility relation restricts not only the set of worlds bound by the Gen in generalizations over individuals but it also restricts the set of worlds bound by the Hab operator in generalizations over eventualities. In a similar manner, I concluded that not only in uttering an IS generalization but also in uttering a perfective generalization a speaker has in mind and a hearer needs to accommodate some background evidence in virtue of which the generalization is true. Like IS generics, perfective habituals seem to express a sort of 'in-principle' generalizations, with a strong level of law-likeness. Moreover, both IS generics and perfective habituals get a prominent existential/episodic reading in 'out of the blue' contexts in which no inherent or associated property of a subject and no norm, tradition or stereotype can be accommodated. However when we state explicitely that they follow from some norm, stereotype or law their generic or habitual reading becomes prominent. These facts indicate that the 'in virtue of' modal mechanism does not only underlie generalizations over individuals taking the form of English IS generics or Polish count singular generics but it also underlies generalizations over eventualities taking the form of perfective habituals in Polish. This means that the 'in virtue of' accessibility relation restricts the set of worlds bound by the Hab operator in generalizations over eventualities. Finally, I suggested that there is an additional restriction on the use of perfective habituals, namely they are used as markers of an evidential mechanism of indirect inference which makes them similar to epistemic necessity modals (cf. Von Fintel and Gillies 2007). Like epistemic modals, perfective habituals cannot be used as assertions or statements of obvious facts which do not need to be inferred from some indirect evidence.

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Quantifiers in Comparatives*

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1 Introduction

One of the puzzling and recently much debated issues in the semantic literature on comparatives are the apparent scope interactions of the comparative operator with some other elements within the comparative sentence. It has been observed that quantifiers seem to be able to interact with the comparative even over the 'than' clause boundary. The adequate semantic treatment of such cases is considered a crucial ingredient in the interpretation of clausal comparatives. The goal of this paper is to provide a semantic analysis for the comparatives in English that accounts for the behaviour of different quantifiers inside 'than' clauses.

Schwarzschild and Wilkinson (2002) among others conclude that universal quantifiers embedded in 'than' clauses usually appear to take scope over the comparative, as shown in (1). However, the 'clause-boundness' of quantifier raising along with other restrictions they discuss make an analysis based on the scoping strategy impossible. This motivates S&W to make a shift to the interval-based interpretation of comparatives. The analysis they propose treats the comparative complement in (1a) as the set of intervals that cover the heights of every girl. Comparing John's height to the maximum from this set derives the correct meaning.

(1) a. John is taller than every girl.
$\forall x$: $girl_{@}(x) \rightarrow Height_{@}(j) > Height_{@}(x)$
= John is taller than the tallest girl.
b. John is taller than I predicted.
$\forall w \in Acc_{@}$: $Height_{@}(j) > Height_{w}(j)$
= John is taller than my maximal prediction.

It turns out that not all universal quantifiers follow the pattern in (1). Schwarzschild (2004) and Heim (2006) discuss a group of necessity modals that behave as if they

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didn't outscope the comparative. In (2) 'have to', in contrast to 'should', triggers the so called more-than-minimum reading that corresponds to the narrow scope of the modal. Obviously, (2b) is a problem for S&W's analysis that is tailored to account for the apparent wide scope of the modal or the more-than-maximum reading.

(2) a. John is taller than he should be.
$\forall w \in Acc_@$: $Height_@(j) > Height_w(j)$
= John is taller than the maximally permitted height.
b. John is taller than he has to be.
$Height_@(j) > max(\{d: \forall w \in Acc_@: Height_w(j) \geq d\})$
= John is taller than the minimally required height.

Embedded existential quantifiers do not behave uniformly either. Possibility modals, like 'be allowed', result in the more-than-maximum interpretation, which can be represented by assigning the existential modal narrow scope with respect to the comparison, cf. (3a). This option is also exploited by nominal indefinites all of which appear in the form of polarity sensitive items, like 'anyone', cf. (3b).

(3) a. John is taller than allowed.
$Height_@(j) > max(\{d: \exists w \in Acc_@: Heightw(j) \geq d\})$
= John is taller than the maximally permitted height.
b. John is taller than any girl is.
$Height_@(j) > max(\{d: \exists x: girl_@(x) \& Height_@(x) \geq d\})$
= John is taller than the tallest girl.

We do not seem to be able to interpret indefinites like 'a girl' or 'some student' under the comparative. They invariably produce wide-scope or generic interpretations. Epistemic modals like 'might' escape the scope of the comparative as well.

(4) a. It is warmer today than it might be tomorrow.
$= \exists w \in Acc_@$: $Temp_@(today) > Temp_w(tomorrow)$
= It is possible that it will be colder tomorrow than it is today.
b. He did better than a student from his course.
$\exists x$: student from his $course_@(x) \& Grade_@(he) > Grade_@(x)$

To conclude, an adequate analysis of comparatives needs to derive the observed readings and explain why than clauses license any terms, but cannot host other existential quantifiers.

The paper is structured in the following way: section 2 gives an overview of the existing analyses and the difficulties they face; section 3.1. concerns the properties of universal modals that can trigger the more-than-minimum reading; in section 3.2. I propose an analysis couched in an interval-based semantics that deals with universal cases; section

3.3. is devoted to 'than' clauses with embedded existential quantifiers; section 4 sums up the results.

2 Challenges to Scope and Selection Strategies

The transition to the interval semantics of comparatives undertaken by Schwarzschild and Wilkinson (2002) and re-implemented in Heim (2006) successfully solves the problem of the apparent wide scope of universal quantifiers. Shifting from points to intervals allows to derive the more-than-maximum reading – comparison with the maximum of the degrees associated with the domain of the quantifier – without moving the quantifier outside the subordinate clause. (5b) is the shifted meaning of the comparative clause of (1b) repeated below in (5a).

(5) a. John is taller than I predicted.
b. $\lambda D.\ \forall w \in Acc_{@}: Height_{w}(j) \in D$
= the set of intervals that include John's height in the prediction worlds

The interpretation of modals triggering the more-than-minimum reading, see (2b), deontic possibility modals and indefinites like 'anyone' presents a difficulty for this type of approach. In general, one needs an additional mechanism to treat the apparent narrow scope of quantifiers under an interval analysis. To account for these cases Schwarzschild (2004) and Heim (2006) introduce the Pi operator that shifts the standard degree-based meaning of the adjective to intervals and can be moved to different scope sites inside the comparative clause. Thus, the apparent narrow scope reading of quantifiers is derived by assigning the relevant quantifiers narrow scope w.r.t. the Pi operator and the apparent wide scope reading corresponds to the narrow scope of the Pi w.r.t. the quantifiers.

In the following subsection I will present the details of Heim's (2006) analysis based on the interaction of the Pi operator with the embedded quantifier and discuss the difficulties that such an approach faces. Then an alternative proposal in Beck (2007) pursuing the so called selection strategy will be introduced and tested against the problematic set of data.

2.1 Scope of Pi

Heim (2006) addresses the availability of readings corresponding to the narrow scope of the quantifier by making the shift form degrees to intervals directly in the syntax and allowing the shifter to enter scope interactions with the quantifiers. She suggests that the adjective expresses a relation between a degree and an individual, see (6b), and the shifter from points to intervals (Pi), defined in (6b), can lift its type to a relation between an interval and an individual. (7b-c) show the derivation of the 'than' clause of (7a). The Pi-phrase originating in the degree argument position of the adjective undergoes short movement and abstracting over its interval-denoting argument makes the subordinate clause to a generalised quantifier over degrees.

(6) a. [[tall]] = $\lambda w.\lambda d.\lambda x.\ \text{Height}_w(x) \geq d$
b. [[Pi]] = $\lambda w.\lambda D.\lambda D'.\ \max(D') \in D$

(7) a. Peter is taller than Mary.
b. [λ2 [Pi 2] [λ1 Mary 1-tall]]
c. $\lambda w.\lambda D.\ \text{Height}_w(m) \in D$ = the set of intervals including Mary's height

The meaning of the main clause that is also derived by the movement of the Pi-phrase, given in (8b), is then quantified into the subordinate clause to give the correct interpretation of the sentence, see (8c).

(8) a. [than-clause] [λ2 [Pi er 2] [λ1 Peter 1-tall]|
b. $\lambda w.\lambda d.\text{Height}_w(p) > d$ = the set of degrees exceeding Peter's height
c. $\lambda w.\ \text{Height}_w(p) > \text{Height}_w(m)$

It is further assumed that Pi can be moved to different available scope sites. Crucially, in the presence of another operator we have two scope possibilities for the shifter. It either undergoes a short movement remaining within the scope of the other operator, see (9) or moves over it taking wider scope, see (10). In the latter case, we get the more-than-minimum reading. A subordinate clause with 'be allowed' would also require scoping Pi above the modal to get the set of intervals including the maximally permitted height.

(9) a. John is taller than he should be.
b. [λ2 should [Pi 2] [λ1 John 1-tall]]
c. $\lambda w.\lambda D.\ \forall w2 \in \text{Acc}_w: \text{Height}_{w2}(j) \in D$
= the set of intervals D s.t. John's height in every accessible world is in D

(10) a. John is taller than he has to be.
b. [λ2 [Pi 2] has to [λ1 John 1-tall]]
c. $\lambda w.\lambda D.\ \max(\lambda d.\forall w2 \in \text{Acc}_w: \text{Height}_{w2}(j) \geq d) \in D$
= the set of intervals D s.t. John's minimally required height is in D

The scope strategy of this kind is successful in deriving correct readings but obviously the scope sites of Pi need to be restricted in every given case. It turns out that not all universal modals can split the scope of Pi and produce the more-than-minimum reading and those that can do not always do that.

The contrast between 'have to' and 'should' illustrated in (2) does not seem accidental. Cross-linguistically we find modals that favour either one reading or another which suggests that we do not deal with the genuine scope ambiguity in these cases. The following pairs from German and Russian display the same properties as their English counterparts in (2).

(11) German:

a. Peter war vorsichtiger als er zu sein brauchte.
P. was cautious-ER than he to be needed
'Peter was more cautious than he had to be.'

b. Peter war vorsichtiger als er hätte sein sollen.
P. was cautious-ER than he had be should
'Peter was more cautious than he should have been.'

(12) Russian:

a. Petja byl ostorožnee čem neobxodimo.
P. was cautious-ER than necessary
'Peter was more cautious than he had to be.'

b. Petja byl ostorožnee čem emu sledovalo byt'.
P. was cautious-ER than him obligatory was
'Peter was more cautious than he should have been.'

Let us first convince ourselves that comparatives with 'should'-like universal modals and with 'be allowed' can only be parsed with the narrow scope of Pi relative to the modal. To see this, one can consider a scenario that excludes the more-than-maximum reading, i.e. a situation in which comparison with the upper limit of the accessible interval would be infelicitous. In (13) I describe a scenario of this kind that we can use to test the pair of sentences in (14).

(13) John was to take care of the alarm while his friends were robbing a bank. John was only instructed not to switch on the alarm before 1 a.m. so that his friends could complete their robbery task.

(14) a. John switched on the alarm later than he had to / was required / necessary.
b. John switched on the alarm later than he should have / was supposed to / was allowed to.

(14b) is not felicitous in the given context, which strongly suggests that it cannot have the more-than-minimum reading, i.e. it cannot describe John's switching of the alarm later than 1 a.m., after the required earliest time. It rather states that John's action occurred after the latest permissible time, which is not consistent with the facts in (13). (14a), on the other hand, describes a state of affairs that could well obtain given (13). Thus, manipulating the context does not have any effect on the interpretation of modals in (14b), which leads us to the conclusion that they can only result in the more-than-maximum reading.

What about 'have to'-like modals? It turns out that they are less consistent in this respect. (15) and (16) are examples of the more-than-minimum and the more-than-maximum readings respectively.

(15) Peter leaves his office 30 min later than necessary to miss rush hour.

(16) He was coming through later than he had to if he were going to retain the overall lead. … The time flashed up above the finish line: 36:53. Almost a minute back. (Google)

The apparent wide scope reading corresponding to the more-than-maximum interpretation obtains with 'have to' quite frequently in comparatives with negative-pole adjectives. On its natural reading the sentence (17) describes the situation in which Peter's height does not reach the required minimum. At first glance, it seems that we need to reproduce the scope configuration in (10) and interpret the modal below Pi. However, in this case, if we follow Heim's negation theory antonymy and decompose 'short' into 'negation + tall', see (18), we can only get comparison with the permitted maximum as shown in (19).

(17) (Suppose that John wants to be a pilot. Pilots need to be between 1,70 and 1,80.) John is shorter than he has to be.

(18) $[\![\text{short}]\!] = \lambda w.\lambda d.\lambda x.\ \text{Height}_w(x) < d$

(19) a. [λ2 [Pi 2] has to [λ1 John 1-short]]
b. $\lambda w.\lambda D.\ \max(\lambda d.\forall w2 \in \text{Acc}_w: \text{Height}_{w2}(j) < d) \in D$
= the set of intervals D s.t. John's maximally permitted height is in D

The desired meaning could be derived under the standard approach by scoping 'have to' over the comparative as represented in (20a). However, the interval-based approach cannot account for this case without additional assumptions about the interpretation of antonyms[1]. If the modal is scoped above Pi, the maximality operator integrated into the meaning of Pi ends up undefined on Peter's degrees of shortness, cf. (20b)[2].

(20) a. $\forall w2 \in \text{Acc}_w: \{d|\ \text{Height}_{w2}(j) < d\} \subset \{d|\ \text{Height}_w(j) < d\}$
b. $\lambda w.\lambda D.\ \forall w2 \in \text{Acc}_w : \max(\lambda d.\ \text{Height}_{w2}(j) < d) \in D$ (undefined)

Negative-pole adjectives do not always result in this problematic reading. We also find examples of 'than' clauses that the interval-based approach can deal with by moving Pi to a position above the modal. Consider the following sentences from Google that feature comparison with the upper bound of the accessible interval.

(21) a. "Buck's text is much shorter than necessary, running only 153 pages in all. He could easily have added 30 pages under the rules of the series."
b. "Shelf-life requirements for processed foods are far shorter than necessary to preserve freshness…"
c. "Germany, France and Denmark found that their industries' emissions were lower than required."

[1]See Büring (2007) for an analysis that could offer a solution to this problem.
[2]We run into the same problem when interpreting the matrix clause. If it does not contain any modal Pi is moved locally and max has to be applied to an open interval.

To summarise this section, Heim's (2006) analysis treating 'than' clauses as generalised quantifiers over degrees is flexible enough to account for all readings of embedded quantifiers. However, I presented some evidence that restricting the scope sites of Pi, which this theory crucially relies on, is a non-trivial task. A class of modals including 'have to' indeed trigger readings corresponding to the wide and narrow scope of Pi. But 'should' and other modal expressions of its type never allow Pi to split its scope – they always seem to sit above the shifting operator. Another challenge for an interval-based approach like Heim (2006) is the interpretation of comparatives with antonyms. Introducing Pi that is based on the maximality operator is in conflict with the negation theory of antonymy.

2.2 Selection Strategy

Beck's (2007) proposal also features a shift to intervals, however, it follows what we will refer to as the selection strategy. Drawing on the recent analysis of temporal clauses in Beaver and Condoravdi (2003) she bases her analysis on the selection of the item of comparison from the interval denoted by the subordinate clause by a maximality operator. Specifically, it is assumed that the shifting operator, if introduced at the LF, can move only locally. As in Heim (2006) 'than' clause is interpreted as a generalised quantifier over degrees, see (22):

(22) a. John is taller than anyone else.
b. [λ2 ∃ λx [Pi 2] [λ1 x 1-tall]]
c. λD. ∃x: $\text{Height}_{@}$(x) ∈ D
= the set of intervals that include the height of at least one individual.

The set denoted by the subordinate clause is passed to a *min* operator that returns the set of the smallest interval(s) contained in it. Then the selection step follows: the specially defined maximality operator applies the set returned by *min* and picks the maximal degree from the interval that extends highest on the relevant scale. Suppose that the salient individuals in the context of (22) are x1, x2 and x3 with their heights arranged as in (23a). Then the derivation of the truth conditions of this sentence in the given scenario is demonstrated in (23b-d).

(23) a. |----------x1-------x2---------x3---------J-------->
b. min(λD. ∃x: $\text{Height}_{@}$(x) ∈ D)
= {{$\text{Height}_{@}$(x1)}, {$\text{Height}_{@}$(x2)}, {$\text{Height}_{@}$(x3)}}
c. max({[$\text{Height}_{@}$(x1)], [$\text{Height}_{@}$(x2)], [$\text{Height}_{@}$(x3)]}) = $\text{Height}_{@}$(x3)
d. [[er]](max(min(than-clause)))(max(min(matrix-clause)))
= $\text{Height}_{@}$(John) > $\text{Height}_{@}$(x3)

For the sentences with embedded universal quantifiers this analysis makes the same predictions as Schwarzschild and Wilkinson (2002). It is easy to verify that in these cases the subordinate clause denotes a set whose minimal interval is the region covering

the relevant degrees of every accessible world or every individual in the restriction of the quantifier. Comparison with the maximum of this interval results in the more-than-maximum reading as desired.

The advantage of the selection strategy over S&W is that it accounts for the more-than-maximum reading of possibility modals and universal readings of embedded 'any' terms. This is achieved without having to scope Pi non-locally and introduce strict restrictions on this move. However, as it stands Beck's (2007) proposal cannot deal with Heim's cases of Pi scoping over universal modals, i.e. the more-than-minimum reading of modals like 'have to'.

In the following sections, I will modify the semantics of a class of embedded universal modals and develop an analysis that accounts for the more-than-minimum reading building on the interval approaches discussed above. My ultimate goal is to demonstrate that one can get over the stipulative part of the scope approach by keeping the scope of the shifting operator local, as the selection strategy does it, and at the same time retain the predictive power of this kind of analysis.

3 Dispensing with the Wide Scope of Pi

The discussion of the scope and selection strategies leads us to the following conclusions. On the one hand, most cases of embedded quantifiers involve comparison with the maximum. This interpretation appears unproblematic within an interval-based approach even with existential quantifiers as Beck's selection analysis proves. One can derive it without resorting to the non-local movement of the Pi operator. On the other hand, the existence of the more-than-minimum reading with a certain class of universal modals pushes the scope theory to the latter extreme measure and as a consequence strict restrictions on the scope of Pi need to be introduced.

The purpose of this section is twofold. First, we argue that the more-than-minimum reading results from the degree semantics of the involved necessity modals and does not require any comparative specific operations, like wide scoping of Pi. Second, we show that the universal reading of the disjunction and 'any' terms and the more-than-maximum reading of some possibility modals can be derived as a free choice effect.

3.1 Universal Scope-Splitters

In this section we will have a closer look at the properties of necessity modals that give rise to the more-than-minimum reading under the comparative. I demonstrated in the previous section that the availability of this reading, cf. (2b), depends on the choice of the modal. Universal modals have been shown to fall into two classes: 'should'-like modals always result in the more-than-maximum interpretation, whereas 'have-to'-like modals,

termed scope-splitters in Schwarzschild (2004), allow comparison with the minimum as well as with the maximum of the span corresponding to the accessible worlds.

One of the common properties of the universal scope-splitters, like 'have to', is their behaviour under 'only'. Unlike 'should' they can participate in the sufficiency modal construction exemplified in (24), see von Fintel and Iatridou (2007). When embedded under 'only' they give rise to the sufficiency inference.

(24) You only *have to* go to the North End to get good cheese.
→ Going to the North End suffices for getting good cheese.

It turns out that the ability of a necessity modal to form an SMC is directly related to the availability of the more-than-minimum reading of this modal under the comparative. Below we use the 'only' test to demonstrate this correlation for a number of modals:

(25) a. You only *need* to go to the North End to get good cheese. (SMC)
b. [[John left later than he *needed* to] in order to miss rush hour].

(26) a. You are only *required* to go to the North End to get good cheese. (SMC)
b. [[John left later than *required*] in order to miss rush hour].

(27) a. You *should* only go to the North End to get good cheese. (#SMC)
b. John left later than [he *should* have in order to miss rush hour].

(28) a. You only *ought to* go to the North End to get good cheese. (#SMC)
b. John left later than [he *ought to* have left in order to miss rush hour].

On the one hand, the *a* variants of (25) and (26), in contrast to the *a* variants of (27) and (28), trigger the sufficiency inference. On the other hand, the modals used in them, i.e. 'need' and 'be required', can produce the more-than-minimum interpretation ('John stayed longer than minimally required with the goal to avoid rush hour'). The modals that do not result in the SMC under 'only' can only trigger the more-than-maximum interpretation ('John left later than the latest possible time before rush hour'). Interestingly, in (27) and (28) 'in order to' clause can only be attached at the level of the comparative clause. This is the only construal that is compatible with the more-than-maximum interpretation. Thus, the contrast between (25)-(26) and (27)-(28) suggests that the mechanism responsible for the selection of modals in the SMC also determines the behaviour of these modals in the comparative clause.

In the context of 'only' the uttered necessity statement refers to the minimal sufficiency point on the effort scale, see Krasikova and Zhechev (2006). The same effect arises in the comparative context as well when we are dealing with the more-than-minimum reading. Let us consider the pilot scenario described in (17) and repeated here in (29a). The minimal required height, 1,70m, that is picked as the standard of comparison on the more-than-minimum reading is precisely the minimal sufficiency degree in this case.

(29) a. Suppose that John wants to be a pilot. Pilots need to be between 1,70 and 1,80.
b. |----------**1,70**----------1,80---------->
necessary ¬ necessary

One can conclude that the necessity scale prominent in the SMC is at work in the comparatives with 'have to'-like modals as well. I suggest that this scale is associated with the relevant necessity modals that need to be analysed as degree predicates of propositions. Following Villalta (2006), that offers a degree semantics for emotive predicates in Spanish and argues that they compare their complements to other alternatives on different kinds of lexically determined scales, I propose that 'necessary' and other predicates that occur in the SMC relate propositions to degrees of their comparative possibility in a given world, see Lewis (1973). Thus, 'necessary' defined in (30) expresses a relation between a proposition and an interval on the scale of likelihood. I stick to the interval-based semantics of degree constructions and assume a lexical shift to intervals, which is equivalent to the introduction of the shifting operator like Pi, cf. Heim (2006).

(30) $[[\text{necessary}]] = \lambda w.\ \lambda D \subseteq S_{P,w}.\ \lambda q.\ P_w(q) \in D$,
where $\forall w_s, q_{st}$: $P_w(q)$ = the likelihood degree of p in w,
and $S_{P,w}$ is a scale that ranks propositions according to their likelihood in w.

The degree operator that binds the degree argument in an unmarked positive sentence like (31a) is the positive operator defined in (32), see von Stechow (2006). POS relates its interval argument to the contextually provided standard of comparison N. I assume that N corresponds to the likelihood degrees of the 'in order to' clause of a necessity statement. In this sense, 'in order to' clause acts as a context setter like 'compared to' phrases. In other words, the POS is restricted by the degrees of likelihood that should be reached in the goal worlds. The *min* operator that is defined to pick the unique minimal interval from a given set provides an appropriate argument for the positive operator, as in the selection approach.

(31) a. It is necessary for John to be 1,70 m tall (in order to become a pilot).
b. POS_N min [λD [necessary D] John 1,70 m tall]
c. $[[\text{min}]] = \lambda w.\lambda Q.\ \iota D\colon D \in Q \ \&\ \forall D'\colon D' \in Q \rightarrow D \subseteq D'$

(32) $[[POS_N]]^g = \lambda w.\ \lambda D.\ \max(g(N)) \leq \max(D)$,
where N is a contextually given standard interval of comparison.

Let us identify the likelihood scale with the reversed height scale, i.e. it is more likely to be short for height than too tall. Then in the scenario (29), the value of N is fixed as in (33b) and the sentence is predicted true iff the likelihood of John's height being 1,70 m is greater or equal to the likelihood that corresponds to 1,70 m, which is satisfied.

(33) a. $\max(g(N)) \leq \max(\min(\lambda D.\ P_{@}(\lambda w.\ \text{Height}_w(j) \in [1{,}70,\ 1{,}70]) \in D))$
b. $g(N) = [P_{@}(1{,}80),\ P_{@}(1{,}70)]$,
where $P_{@}(n)$ stands for the likelihood of John being n tall in @

One can verify that any alternative sentence of the form 'It is necessary for John to be *n* tall' with $n \leq 1{,}70$ m, is predicted true under this analysis. This prediction is welcome and the fact that the likelihood degree of the uttered alternative is usually perceived as sufficient can be derived as a scalar implicature if we strengthen the meaning by a covert 'only'. Embedding under an overt 'only', as in the SMC, produces the same effect: the likelihood degrees greater than the likelihood of the uttered complement of 'necessary' are said to lie within the goal interval, i.e. the uttered alternative is sufficient.

To summarise this section, I demonstrated that there is correlation between the ability of a necessity modal to trigger the more-than-minimum reading in comparatives and produce sufficiency inference under 'only'. I proposed that this is a result of the degree-based semantics of the relevant group of necessity expressions. In the following section I will use the proposed meaning for the 'have to'-like modals to derive the more-than-minimum interpretation under the comparative.

3.2 Deriving More-Than-Minimum Reading

Let us apply the semantics for 'have to' developed in the previous section to derive the truth conditions of the comparative sentence (34).

(34) John is taller than he has to be.

I will follow the selection strategy of Beck (2007) and make use of the coercion operators in order to reduce intervals to points. However, this choice is not dictated by the assumptions I made above. It can be shown that the present analysis can also be implemented in Heim's (2006) theory.

The comparative operator compares the maxima of the intervals obtained from the comparative and the main clause, see (35a). The *min* operator defined in (31c) reduces the generalised quantifier type of the main and the embedded clause to the interval type, as sketched in (35b).

(35) a. $[\![\text{er}]\!] = \lambda w.\lambda D.\lambda D'.\ \max(D') > \max(D)$
b. [[er]]([[min]]([[than clause]])([[min]]([[main clause]])

Under the assumption that 'have to' denotes a gradable predicate like 'necessary' defined in (30), the analysis of the embedded clause proceeds as in (36). According to (36b), we obtain a set of intervals D on the height scale, s.t. the likelihood of John's height being in D is greater than or equal to the maximal likelihood of the neutral interval.

(36) a. $\lambda D\ POS_N\ min\ [\lambda D2\ [have\ to\ D2]\ John\ D\ tall]$
b. $\lambda D.\ max(g(N)) \leq max(min\ (\lambda D2.\ P_{@}(\lambda w.\ Height_w(j) \in D) \in D2))$

I follow the assumptions made in the previous section and identify the likelihood ordering with the reversed height scale. The neutral interval is set to the height in the 'goal' worlds, i.e. $[P_{@}(1,80), P_{@}(1,70)]$. It can now be calculated that the set (36b) consists of intervals whose upper bound does not exceed 1,70.

The *min* operator cannot pick the unique minimal interval from this set. To fix this, I propose to embed the necessity clause in (36a) under a covert *exh* operator following the pragmatic program defended in Fox (2007) that allows to insert a covert exhaustification operator anywhere in a structure if this step strengthens the ordinary meaning. The final LF for the embedded clause is given in (37).

(37) $\lambda D\ exh_C\ {\sim}C\ [POS_N\ min\ [\lambda D2\ [have\ to\ D2]\ John\ D_F\ tall]]$

To calculate the extension of (37) in the scenario at hand we need to understand the contribution of *exh*. Simplifying Fox's (2007) definition, let us assume that *exh* projects the truth of the prejacent and negates all stronger alternatives from its restriction set C, see (38a). As indicated in (37), the set C is restricted by the focus anaphor introduced by the ~ operator and the focus falls on the interval argument of the gradable predicate. This gives us the definition of C in (38b).

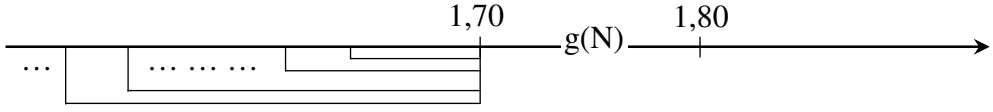
(38) a. $[[exh]] = \lambda w.\lambda C.\lambda p.\ p(w)\ \&\ \forall q \in C: q \subseteq p \rightarrow \neg q(w)$
b. $C = \{\lambda w.max(g(N)) \leq max(min\ (\lambda D2.\ P_w(\lambda w2.\ Height_{w2}(j) \in D) \in D2): D \subseteq S_{Height})\}$

Obviously, the stronger alternatives are the ones, that involve a greater height interval. One can verify that for any two intervals D′ and D s.t. D′ > D the statement that John's height has to be in D′ implies that it has to be in D. Therefore the structure in (37) defines the following set of intervals:

(39) $\lambda D.\ max(g(N)) \leq max(min\ (\lambda D2.\ P_{@}(\lambda w.\ Height_w(j) \in D) \in D2))\ \&$
$\forall D3: D3 > D \rightarrow max(g(N)) > max(min\ (\lambda D2.\ P_{@}(\lambda w.\ Height_w(j) \in D3) \in D2))$

(39) restricts the definition in (36) by the requirement that any height interval greater than D be below the neutral interval on the likelihood scale, i.e. below the likelihood degree of 1,70m. Since the likelihood ordering is the converse of the height scale this implies that the set in (39) contains intervals whose upper bound is 1,70, as illustrated on the following scheme:

(40)



The minimum from this set is [1,70, 1,70]. Comparing John's height in the actual world to this interval gives us the desired more-than-minimum reading.

An important consequence of this analysis is the dependence of the interpretation of comparatives with embedded 'have to' on the likelihood ordering in the given context. The availability of more-than-minimum and more-than-maximum reading in these cases follows from the fact that the item of comparison is fixed with respect to the scale of the modal – it is the minimal compliance amount on the likelihood scale. Let us consider examples (15) and (16) repeated below in (41).

(41) a. Peter leaves his office 30 min later than necessary to miss rush hour.
b. He was coming through later than he had to if he were going to retain the overall lead.

In (41a), the more-than-minimum case, the item of comparison is the earliest allowed leave for the day. As in the pilot scenario above, the adjective scale is the converse of the likelihood scale, i.e. it is more likely that you leave your office too early than too late. In contrast, in (41b) two scales are unidirectional – the later you reach the finish line the more likely it is. Therefore the latest point from the time span corresponding to the goal ("you retain the overall lead") is picked as the standard of comparison and we get the more-than-maximum reading. Thus, the present analysis correctly predicts that the item of comparison is the maximum from the 'goal' interval, i.e. the original accessible interval, with respect to the likelihood scale.

I conclude this section with a short discussion of a sentence with an antonym. Remember that (17) repeated in (42) cannot be captured in Heim's (2006) theory, the problem being the negation in the definition of the antonym that results in the undefinedness of the Pi operator. In order to deal with this one can redefine Pi in order to suit such cases. I will consider a different strategy the motivation of which I will leave for a different occasion. Assume that antonyms are associated with different orderings on the same kind of objects. As shown in (43), 'tall' relates an individual to a set of heights ordered on the scale of tallness, whereas 'short' takes a set of height intervals ordered on the reversed shortness scale.

(42) John is shorter than he has to be.

(43) a. $[[\text{tall}]] = \lambda w.\lambda D \subseteq S_{\text{tall}}.\lambda x.\ \text{Height}_w(x) \in D$
b. $[[\text{short}]] = \lambda w.\lambda D \subseteq S_{\text{short}}.\lambda x.\ \text{Height}_w(x) \in D$

To derive the truth conditions of (42) we consider the same scenario we used for the analysis of its counterpart with 'tall'. Crucially, we do not change our assumptions about the direction of the likelihood scale. The reader can verify that (42) is predicted true in this scenario iff John's actual height exceeds the minimal required height on the scale of shortness, i.e. iff John is shorter than 1,70 m, which is a welcome result.

3.3 Free Choice 'Any'

In this section I will argue that existential quantifiers triggering the quasi universal interpretation, see (3), do not present a problem for an analysis that disallows the non-local scope of the Pi operator To give a preview, the analysis I am going to develop is based on strengthening of the embedded clause by a free choice implicature.
Let us consider a comparative sentence with an embedded disjunction.

(44) Peter is taller than John or Bill.

On one of its readings the sentence conveys the meaning that Peter's height exceeds the height of the tallest person out of John and Bill. We have seen in section 2 that this reading is derivable in the scope as well as in the selection approach. In the former case, Pi is scoped above the disjunction, which mimics von Stechow's (1984) analysis that keeps the disjunction in the scope of the comparative operator. In the latter case, the specially defined *max* operator picks the height of the tallest person as the item of comparison. I propose an alternative way to derive the more-than-maximum reading of (44). Let us consider the analysis of the embedded clause of (44) within the interval-based approach I used above:

(45) $\lambda D.\ Height_{@}(j) \in D\ (\ Height_{@}(b) \in D$
= the set of intervals D, s.t. D contains John's height or Bill's height.

Interestingly, (46) creates the kind of environment that has been argued to trigger the free choice effect, namely disjunction under an existential quantifier. To see this, consider the parallel between (46a) equivalent to (45) and (46b) that represents the sentence 'You may eat the cake or the ice-cream' implying among other things that you are free to choose between the two options.

(46) a. $\lambda D.\ \exists d \in D: Height_{@}(j) = d \vee Height_{@}(b) = d$
b. $\exists w2 \in Acc_{w}$: you eat the cake in w2 $\vee$ you eat an ice-cream in w2

I suggest that the mechanism that is responsible for the free choice effect of (46b) applies in the comparative case as well and results in the universal interpretation. To demonstrate this, I follow the proposal in Fox (2007) that derives the free choice implicature by embedding (46b) under two *exh* operators. I assume Fox's entry for *exh* in (47) and the standard definition of the set of alternatives for disjunction, see (48).

(47) $[[exh]]^{w}(A_{(st)t})(p_{st}) = \lambda w.\ p(w) \ \&\ \forall q \in I\text{-}E(p,A): \neg q(w)$, where $I\text{-}E(p,A) =$
$\cap \{A2 \subseteq A |\ A2$ is a maximal set in A, s.t.,$\{\neg r: r \in A2\} \cup \{p\}$ is consistent$\}$

(48) $A = \{\lambda w.\ \exists d \in D: Height_{w}(j) = d \vee Height_{w}(b) = d;$
$\lambda w.\ \exists d \in D: Height_{w}(j) = d \wedge Height_{w}(b) = d;$
$\lambda w.\ \exists d \in D: Height_{w}(j) = d;\ \lambda w.\ \exists d \in D: Height_{w}(b) = d\}$

One can verify that embedding the statement in (46) under the *exh* restricted by the A in (48) results in the following extension of the comparative clause:

(49) $\lambda D.\ \exists d \in D: \text{Height}_{@}(j) = d \vee \text{Height}_{@}(b) = d \ \&$
$\neg\exists d \in D: \text{Height}_{@}(j) = d \wedge \text{Height}_{@}(b) = d$
= the set of intervals D, s.t. D contains John's height or Bill's height but does not contain a degree corresponding to the height of both.

Following Fox, I pass the statement in (49) to the second *exh* restricted by the set of exhaustified alternatives in (50). (51) is the resulting meaning of the 'than' clause. The last exhaustification step adds the requirement that both the height of Bill and the height of John be included in D. This derives the superlative interpretation of (44). It can be shown that this analysis makes the same predictions for (3a-b).

(50) $A^{exh} = \{[[exh]]^{w}(A)(p): p \in A\} =$
$\{\lambda w.\exists d \in D: \text{Height}_{w}(j) = d \vee \text{Height}_{w}(b) = d$
$\& \neg\exists d \in D: \text{Height}_{w}(j) = d \wedge \text{Height}_{w}(b) = d;$
$\lambda w.\exists d \in D: \text{Height}_{w}(j) = d \ \& \neg\exists d \in D: \text{Height}_{w}(b) = d;$
$\lambda w.\neg\exists d \in D: \text{Height}_{w}(j) = d \ \& \exists d \in D: \text{Height}_{w}(b) = d\}$

(51) $\lambda D.\ \exists d \in D: \text{Height}_{@}(j) = d \vee \text{Height}_{@}(b) = d \ \&$
$\neg\exists d \in D: \text{Height}_{@}(j) = d \wedge \text{Height}_{@}(b) = d \ \&$
$\exists d \in D: \text{Height}_{@}(j) = d \ \& \exists d \in D: \text{Height}_{@}(b) = d$

The results obtained in this section allow Heim's scope analysis to do without the long movement of Pi in all cases of embedded existential quantifiers. The selection analysis can now use a simpler definition of coercion operators that makes them pick either an interval or a point from a set of such, e.g. (31c). I leave out the discussion of 'some' indefinites and epistemic modals under the selection approach for reasons of space. Their treatment would presumably require some mechanism that generates wide scope or generic interpretations in non-comparative contexts as well.

4 Conclusion

In this paper I attempted to show that the availability of different interpretations in the comparatives with embedded quantifiers is not a matter of the relative scope of the involved operators. I contrasted 'should'-like modals, universal quantifiers over individuals, any-terms and non-epistemic possibility modals with a relatively small group of 'have to'-like modals. I argued that the behaviour of the former does not support the flexibility of the scope approach – these expressions always result in the more-than-maximum reading. The latter class can indeed lead to different interpretations. To account for this pattern I proposed a degree-based semantics for necessity modals like 'have to' and demonstrated that the observed readings under the comparative is a consequence of the interplay be-

tween the likelihood ordering introduced by the modal and the scale of the adjective. I further argued that the quasi universal interpretation of some existential quantifiers in the comparative context is due to the free choice implicature that strengthens the meaning of the embedded clause. I hope to have shown that the existing approaches to the analysis of comparatives do not have to resort to comparative-specific scope mechanisms.

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Givenness and Maximize Presupposition *

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Abstract

Based on word order patterns in Czech, I argue that a cross-linguistically common partitioning of a sentence between given and new material is a result of an interplay of independently needed pragmatic notions: the Maximize Presupposition principle of Heim (1991) and presupposition failure. I formalize the intuition by introducing presuppositions by a freely insertable recursive operator which applies upwards and which adds to each successive argument an existential presupposition (cf. Sauerland 2005). Movement in this approach is free but dispreferred and it is licensed only if it leads to an interpretation which would not be available otherwise (along the lines of Fox (2000, 1995); Reinhart (1995)). The resulting structure is licensed by the interfaces only if it satisfies Maximize presupposition and does not lead to presupposition failure.

1 Introduction

Czech is in general SVO language but other orders are attested as well. In principle, any word order combination may result in a grammatical structure. There is, however, a direct correlation between the word order of an utterance and its information structure. More precisely, in a given context and with a particular interpretation, there is *only one* felicitous order.

Consider (1) where (1-a) is the basic word order, i.e., the order which is felicitous in the out of blue context, and (1-b) is a derived order.

(1) a. SVO: Chlapec našel lízátko.
boy.Nom found lollipop.Acc

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b. `OVS:` Lízátko našel chlapec.
lollipop.Acc found boy.Nom

(2) lists interpretations that may be available to the word orders from (1).[1] The examples illustrate that there is an asymmetry in the range of interpretations available for the basic word order and a derived order. The first empirical generalization we need to account for is that while a basic word order is felicitous in multiple contexts, a derived word order disambiguates.

(2) Possible interpretations:

a. `SVO:` Chlapec našel lízátko.
boy.Nom found lollipop.Acc
(i) 'A boy found a lollipop.' ⟵ `new > new`
(ii) 'The boy found a lollipop.' ⟵ `given > new`
(iii) 'The boy found the lollipop.' ⟵ `given > given`
(iv)#'A boy found the lollipop.' ⟵ # `new > given`

b. `OVS:` Lízátko našel chlapec. ⟵ `given > new`
lollipop.Acc found boy.Nom
'A boy found the lollipop.'

Another property of the Czech word orders that we learn from (1) and (2) is that there is a relation between given and new parts of the utterance (where *given* stands for items introduced in the previous discourse and *new* refers to new information). As we can see if there are any given elements, they must linearly precede all new elements. We can understand this generalization in terms of a linear partition between the given and the new part of an utterance. As we will see in more details shortly, such a partition may in principle fall at any point of the structure. For now, we capture the second empirical generalization about word orders in Czech as in (3).

(3) a. # `new > given`
b. ✓`given > new`

The fact that complicates the matters and makes the account of the Czech word order patterns a nontrivial task is that not every word order is possible with a particular interpretation. Thus even though the given-before-new condition is a necessary condition, it is not a sufficient one. For example, if the verb and the object are given and the only new material is the subject, the only felicitous order is OVS.[2]

(4) a. ✓**O V** S

[1] In this paper, I consider only examples without contrastive focus or topic intonation and interpretation. All the examples under discussion are realized with a neutral intonation contour, i.e., the utterance begins with a slight rise followed by a steady decline. The main sentential prominence falls on the first syllable of the linearly rightmost prosodic word.

[2] Given elements are throughout the paper typeset in boldface.

b. # **V O** S

Before we proceed to the actual proposal, there is one more empirical observation that needs to be accounted for: in Czech, utterances are internally divided into *domains*. There may be a partition between given and new within any domain. Thus, there can be more than one partition within an utterance (or a finite clause). Domains correspond to chunks that have been independently argued to be propositional. Some examples are given in (5) and (6).[3]

(5) a. Do you know anything about Petr and Marie?
b. Náhodou jsem slyšel, že **Petrovi** ‖ říkala nějaká paní, že
accidentally Aux.1sg heard that Petr.Dat told some lady that
Marii ‖ zaměstnali v ABB.
Marie.Acc employed.1pl in ABB
'I accidentally heard that some lady told Petr that Marie got employed in the ABB.'

(6) a. Do you know what Mary did with her famous boat?
b. **Marie** ‖ se pokusila **loď** ‖ prodat.
Marie REFL tried boat to-sell
'Marie tried to sell the boat (but no one wanted to buy it).'
c. **Marii** ‖ nařídil soud **loď** ‖ prodat.
Marie.Dat ordered court.Nom boat.Acc to-sell
'(You won't believe it but) a court ordered Marie to sell the boat.'

To summarize, there are three basic empirical generalizations that need to be accounted for:

(7) a. While a basic word order is felicitous in multiple contexts, a derived word order disambiguates.
b. If there is a given element, it must precede all new elements.
c. An utterance may be divided into domains. Within any domain there can be a partition between given and new.

The goal of this paper is (i) to characterize the word order restrictions and their relation to information structure, and (ii) to explain it.

The paper is structured as follows. I will spell out the proposal in section 2. Section 3 looks at further predictions the account makes. In section 4 I will address the question of what constitutes the domains. Finally, section 5 discusses comparison of structures which is needed in order to choose the best alternative.

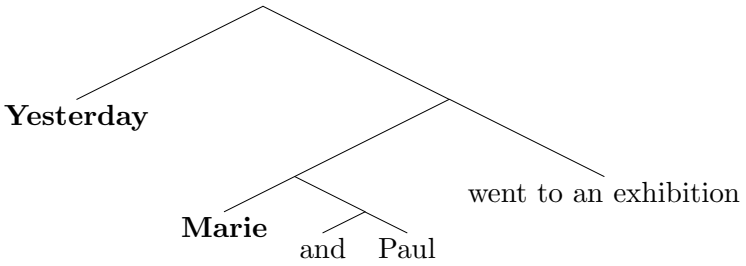
[3]Partitions are throughout the text marked by ‖ sign.

2 The proposal

The basic intuition I follow here has been around at least since Mathesius' Prague lectures in 1908. The intution is that structures are divided into domains and any domain can be partitioned at any position within the domain. This is what we learn from the basic word order patterns. I shift the intuition here a bit and instead of thinking about the partition as two separate domains, I will assume that there is a point in the structure from which everything up is given. As we will see, this move results in different predictions.

Consider the structure in (8). As we can see, even if the partition is off the main sentential spine, the spine is affected upwards. In structural terms, the partition point is asymmetrically c-commanded by all given elements, but the non-given elements do not need to be asymmetrically c-commanded by the partition point.

(8) (Context: Did Mary do anything yesterday?)
Yesterday Marie ‖ and Paul went to an exhibition.



In other words, it is more natural to define the structural relation between the partition and the given elements and not the relation between the partition and the new elements. The relation to the new elements is easier to define as an elsewhere condition.

I will formalize this observation in the following way. I propose to capture the structural relation by a syncategorematic operator which marks elements in its scope as given. For concreteness, I follow Sauerland (2005) in assuming that givenness gives rise to an existential presupposition (cf. Schwarzschild 1999). My interest, however, lies in how givenness applies compositionally, the actual lexical entry is not crucial. The proposal may be modified in this respect if the need arises.

Crucially, the operator recursively propagates upwards and terminates on an atomic semantic type.[4] The operator which I will call G-operator, where G stands for Given, is defined in (9).[5,6] A schematic illustration of how the operator works is given in (10).

[4]Throughout the paper I will work with a simplifying assumption that the relevant atomic type is propositional, i.e., t or $< s, t >$. The reader should keep in mind that it may be discovered that other semantic types function as terminating points as well. The argument goes through as long as we can define the terminating condition in compositional terms.

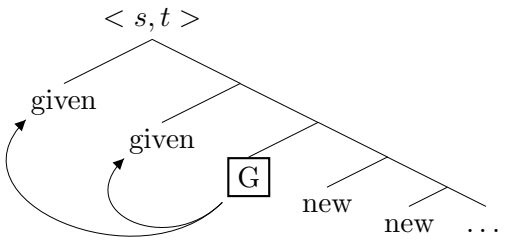
[5]This particular formalutation of the G-operator has been suggested by Roni Katzir.

[6]The operator may seem to be unusual because it operates upwards. This is not so exceptional though, see for example Partee and Rooth (1983) and Beck and Sauerland (2000) for recursive upwards oriented operators for coordination and cumulativity.

(9) **G-operator:**

$$G(B) = \begin{cases} \lambda A_\alpha : Given(A).G([\![B\ A]\!]) & B \text{ is of type } <\alpha,\beta> \text{ where } \alpha,\ \beta \text{ is not an atomic semantic type} \\ B & \text{otherwise} \end{cases}$$

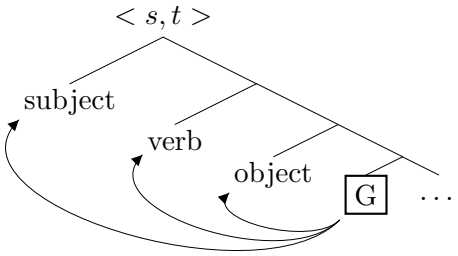
(10)



Let's have a look at what the operator does for us. First of all, once the operator starts propagating upwards it does not stop unless it reaches the edge of a domain. This results in structures being divided into domains in which given precedes new. Furthermore, the operator can be inserted at any place of the structure, therefore, we expect the partition between given and new to fall at any point of the structure as well.

Now we can account for basic word order structures and their interpretation. The question is whether the proposal can account for structures in which a given element is base generated below a new element. To see this, let's look at what happens if only the object is given and the subject and the verb are new. The relevant structure is given in (11).

(11) Only object is given (S V ‖ **O**):
Option I: G operator inserted on O:



There is no way we can insert the G-operator without adding a presupposition to elements which are given. Since the elements above the object are new, the result would be presupposition failure. We have already seen in (2) that in such a configuration the word order must change, as in (12).

(12) S V **O** → **O** [G] V S

The question that arises is why we need to change the order, why we can't just omit the operator. This is in fact a non-trivial question. If we did not insert the operator, the structure would be syntactically well-formed and interpretable. Furthermore, if we follow Schwarzschild (1999) and others in assuming that for α to be given there must be an antecedent in the previous discourse (or α must be implied by the previous discourse), the object should be interpreted as given even without the G-operator being inserted. In short, there does not seem to be any problem with the structure without reordering.

I argue that the reason why the structure without reordering is not felicitous is because it violates the principle of Maximize Presupposition (Heim, 1991; Sauerland, 2007), (13).

(13) **Maximize Presupposition**
In context C used the most informative presupposition satisfied in C.

The principle asserts that if a presupposition may be grammatically marked, it must be marked. In Czech, there is a tension betweeen Maximize Presupposition that prefers the G-operator to be inserted low in the structure and the need to avoid presupposition failure. To avoid the conflict between Maximize Presupposition and presupposition failure we need to reorder the structure.[7] In particular, I assume that the reordering is a result of free movement which is in general dispreffered but which may be licensed if it gives rise to an otherwise unavailable interpretation (cf. Reinhart 1995, 2006; Fox 1995, 2000).[8] The resulting structure is licensed by the interfaces only if it satisfies Maximize Presupposition and does not lead to presupposition failure.

To summarize, the proposal derives the relation between word order and information structure through interaction of Maximize Presupposition, the need to avoid presupposition failure, and the economy condition on movement. The only component not familiar from other areas is the recursive G-operator. In section 5, I will argue that the interaction can be modeled in a grammar which uses reference set computation.

So far we have encountered two basic situations: (i) basic word orders in which it was sufficient to plug a G-operator which marked everything upwards as presupposed, and (ii) structures in which there was a given element below a new element and the structure must have been reordered. Crucially, I have argued that reordering is licensed only if it can avoid a conflict between two pragmatic requirements: Maximize presupposition and presupposition failure.[9] The question that immediately arises is what happens if the interpretative conflict cannot be avoided by movement because movement is excluded on independent syntactic grounds.

[7]Movement in ordert to strenghten presupposition, even though not in connection with Maximize Presupposition, has been explored in other recent work, cf. for example Wagner 2005, To appear.

[8]The movement is furthermore restricted by independent syntactic restrictions on movement in Czech. For more details see Kučerová 2007.

[9]Notice that the proposal predicts that if a language does not have a recursive G-operator but a non-recursive one, such as English (Sauerland, 2005), the conflict between Maximize Presupposition and presupposition failure does not arise and reordering is not expected.

3 Further predictions: Coordination

In the cases we have discussed so far movement was dispreferred but it could have been licensed if it avoided an interpretive conflict between Maximize Presupposition and presupposition failure. The question is what happens if movement is not only disprefered but is not allowed. It is not clear what exactly the prediction is: either one of the pragmatic notions might get violated, or there might be another strategy that could be used to solve the conflict.

An obvious place to look at is syntactic islands. However, the predictions are not easy to test because islands often coincide with an atomic type. Thus, we cannot be sure whether there is a G-operator that terminates on the edge of the island. Fortunately, there is an exception: coordinations. Since a coordination preserves its semantic type it is possible to construct examples in which inserting the G-operator should necessarily lead to presupposition failure because the operator would propagate out of the coordination. There are two basic cases to consider: (i) a structure in which a coordination is adjoined to an atomic semantic type, and (ii) a structure in which a coordination is not adjoined to an atomic semantic type. In particular we will look at DP coordinations.

In the case of a coordination adjoined to an atomic semantic type we predict that there should be no problem with a DP coordination if it is adjoined to an atomic semantic type (e.g., a coordinated subject). We predict that the structure should be well formed as long as the given part of the coordination precedes the new part of the coordination. This prediction is borne out as can be seen in (15) and (16). The relevant context is given in (14).[10]

(14) Na programu byla diskuse o nové učitelce. `context`
on program was discussion about new teacher
'The topic of the program was a discussion about a new teacher.'

(15) **Učitelku** a (její) žáky to překvapilo. ⟵ ✓`DP & DP`
teacher and her students it surprised
'The teacher and (her) students were surprised by it.'

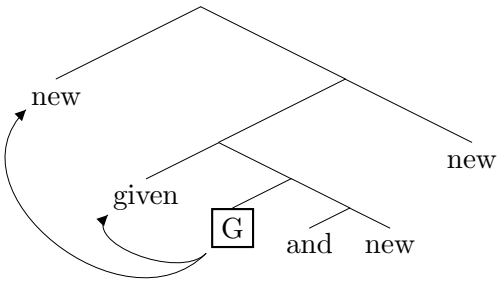
(16) #Žáky a **učitelku** to překvapilo. ⟵ `# DP & DP`
students and teacher it surprised
'A teacher and (her) students were surprised by it.'

Let's now consider predictions for the later case, i.e., the case in which a DP coordination is not adjoined to an atomic semantic type. The predictions are unclear. As illustrated by (17), inserting the G-operator necessarily leads to presupposition failure. On the other hand, if the operator is not inserted, the Maximize Presupposition principle is

[10]Notice that the appropriate structure must be base generated. It cannot be derived by movement. This immediately raises the question of how is the right structure selected. I will address the question in section 5.

violated. If we look at the actual data, in (18), we see that the structure is not felicitous, suggesting that the pragmatic requirements must be obeyed.

(17)



(18) #To se nelíbilo ani **učitelce** ani žákům. ⟵ `# new > DP & DP`
it REFL not-liked nor teacher nor students
'Neither a teacher nor students were happy about it.'

Interestingly, the grammar provides a way out: if the given element is pronominalized,[11] the final structure is felicitous, (19).

(19) a. To se nelíbilo ani **jí** ani žákům. ✓`pronoun`
it REFL not-liked nor her nor students
'Neither she nor students were happy about it.'
b. To se nelíbilo ani **té** **učitelce** ani žákům. ✓`that DP`
it REFL not-liked nor that teacher nor students
'Neither the/that teacher nor students were happy about it.'

This is puzzling. Why should pronominalization be relevant? I argue that the reason is that the lexical entries of pronouns give rise to a presupposition, thus Maximize Presupposition may be satisfied even if the presupposition is not added by the G-operator. The prediction of this move is clear: If pronouns never require to be marked by the G-operator, they should not undergo movement because of givenness. This prediction is borne out as can be seen in (20). If the object 'Pavel' is realized as a pronoun, it cannot precede the new subject 'Marie'. On the other hand, if the object is realized by the full DP 'Pavel', the reordering is mandatory. The example in (21) is here as a control, showing that in principle there is nothing wrong with a pronoun being sentence initial.

(20) What do you know about Pavel?
a. Marie **ho** viděla na nádraží. ✓`new > pron.`
Marie.Nom him.Acc saw on railway-station

[11]The given element may be either realized by a personal pronoun or the DP must be modified by a demonstrative pronoun. The two strategies lead to a slightly different interpretations. I put the difference aside and concentrate only on structures with personal pronouns.

b. #Marie **Pavla** viděla na nádraží. `# new > DP`
Marie.Nom Pavla.Acc saw on railway-station
c. #**Jeho** viděla Marie na nádraží. `# pron. 1st`
him.Acc saw Marie.Nom on railway-station
d. **Pavla** viděla Marie na nádraží. `✓DP first`
Pavel.Acc saw Marie.Nom on railway-station
'Marie saw him/Pavel in the railway-station.'

(21) JEho Marie neviděla. Jenom Petra.
him.Acc Marie.Nom not-saw only Petr.Acc
'Marie didn't see HIM. She saw only Peter.'

We can conclude that if a lexical entry of α gives rise to a presupposition, there is no need to introduce the presupposition by the G-operator. Notice that in the case of pronominalization it is crucial that we have motivated the reordering as marking of given elements. If we semantically marked new elements, the distinct behavior of pronouns and full DPs would be entirely unexpected.

3.1 A remaining puzzle

An interesting question which I will not be able to answer this time is what happens if there is no nominal alternative that could rescue the interpretation. A place to look at are verbal coordinations. The relevant scenario is in (22). As we can see in (23), verbs also move for pragmatic reasons. They also obey the requirement that the given verb must precede the new one, compare (24) and (25).

(22) Many of my friends have recently decided to change their lifestyle...
a. Tak jedna moje kamarádka bude víc **číst**. ⟵ `scenario`
so one my friend will more read
'For example, a friend of mine will read more.'

(23) **Číst** bude (taky) její přítel ___.
read will also her friend
'Her boyfriend will read as well.'

(24) A její přítel bude [**číst** a překládat]. ⟵ ✓**VP** & VP
and her friend will read and translate
'And her boyfriend will read and translate.'

(25) #A její přítel bude [překládat a **číst**]. ⟵ # VP & **VP**
and her friend will translate and read
'And her boyfriend will translate and read.'

Unfortunately, at this point we cannot conclude more from the facts. The reason is that it is not clear where the relevant semantic boundary lies. Furthermore, we cannot exclude the possibility that the relevant structures contain coordination reduction. More research needs to be done in order to understand the data.

4 Establishing the domains

Under the definition in (9), the G-operator terminates on an atomic semantic type. If this is correct then it follows that given elements should gather on the closest left edge corresponding to an atomic type.[12] This is the closest structural point where they achieve the desirable interpretation. This section looks closely at whether this prediction is borne out.

Let's first consider finite clauses. Since finite clauses correspond to propositions, we expect given elements not to be able to move out of a finite clause. This is correct, as witnessed by (26).[13]

(26) For a long time I didn't know what was going on with Mary. But then...
   a. mi Petr řekl, že **Marii** potkalo velké štěstí.
      me Petr.Nom told that Marie.Acc met big happiness
      'Peter told me that Marie got extremely lucky. (She won a lottery.)'
   b. #**Marii** mi Petr řekl, že potkalo velké štěstí.
      Marie.Acc me Petr.Nom told that met big happiness

Infinitives too correspond to propositions.[14] Thus, we predict given elements not to be able to move out of infinitives as well. As can be seen in (27), this is correct.[15]

(27) What happened to the antique chair you got many years ago from Mary?
   a. Petr se pokusil / chtěl / dokázal **tu židli** spálit.
      Petr REFL tried wanted managed that chair burn.Inf
      'Petr tried/wanted/managed to burn the chair.'
   b. #**Tu židli** (se) Petr pokusil / chtěl / dokázal spálit.
      that chair (REFL) Petr tried wanted managed burn.Inf
      'Petr tried/wanted/managed to burn the chair.'

Interestingly, in Czech different tenses have different morphological formation. While

[12] For much what follows, it is enough to look only at propositional types.

[13] All infelicitous examples in this section are grammatical but the fronted element cannot be interpreted as given. The fronted element usually obtains topic or contrastive reading; for example, *Mary is fond of Peter, not of Bill.*, (32-c), or *As to the chair, Peter wanted to burn it, but he definitely wanted to keep the table.*, (27-b).

[14] I use the word proposition both for tense and tenseless propositions.

[15] There is no problem with moving out of infinitives in general. For example clitics may freely move out of infinitives in Czech.

present tense is synthetic (the lexical verb is fully inflected), future tense is analytic (formed by an auxiliary and an infinitive). If we assume that a tense auxiliary selects for a proposition, we expect to find a difference in locality of movement of given elements between the Present tense and the Future tense. As can be seen in (28) and (29), this is indeed so. While in the Present tense, given elements move to the left edge of the finite clause, the movement in the Future tense is more local.

(28) *Present: given elements move to the left edge*

a. What is happening to the book?

b. **Tu knihu** ‖ dává Marie Petrovi. ← `synthetic`
the book.Acc gives Marie.Nom Petr.Dat
'Marie gives the book to Petr.'

(29) *Future: given elements may move only locally:*

a. What will happen to the book?

b. Marie bude **tu knihu** dávat Petrovi. ← `analytic`
Marie.Nom will the book.Acc give.Inf Petr.Dat
'Marie will give the book to Peter.'

c. #**Tu knihu** bude Marie dávat Petrovi.
the book.Acc will Marie.Nom give.Inf Petr.Dat
'Marie will give the book to Peter.'

One might object that the contrast is related to the future tense being formed by an infinitive. The same contrast is attested in a more minimal environment, in particular in the Past tense. In Czech there is a difference between 3rd person and 1st/2nd person. Only 1st and 2nd person have an overt tense auxiliary, there is no auxiliary for 3rd person. Thus, we predict that given elements move further in sentences with 3rd person subjects than in sentences with 1st or 2nd person subjects. As can be seen in (30) and (31), the prediction is borne out.

(30) *3sg.:*

a. What happened to the boat that got demaged in the last storm?

b. **Loď** opravil jeden technik.
boat.Acc repaired one technician.Nom
'A technician repaired the boat.'

(31) *1pl.:*

a. What happened to the boat that got demaged in the last storm?

b. Jeden technik a já jsme **loď** opravili.
one technician.Nom and I Aux.1pl boat.Acc repaired
'A technician and I repaired the boat.'

Since small clauses correspond to propositions as well, we expect given elements to be unable to move out of small clauses. This is correct, as witnessed by (32).

(32) a. Why does Peter look so happy?
b. Marie je **na Petra** pyšná ___.
Marie.Nom is of Petr proud
'Marie is fond of Peter.'
c. #**Na Petra** je Marie pyšná.
of Petr is Marie proud

To sum up, movement of a given element is attested only within the smallest propositional domain that contains the element. This is expected under the proposal which assumes that movement for givenness is licensed only if it is needed to create a configuration in which the G-operator may be inserted without causing presupposition failure.

5 The evaluation component

The proposal developed in this paper relies on an architecture of grammar which allows comparison of different structures. This follows both from the economy condition on movement and the pronominalization facts. One possible way to account for the data is to assume a grammar which computes global comparison over structures. To make the proposal precise, we need to define two components: (i) a reference set over which the comparison is computed, and (ii) an evaluation metric. The definition of the reference set I argue for is given in (33).

(33) **Reference set for Maximize Presupposition evaluation**
For purposes of Maximize Presupposition, the reference set, toward which Maximize presupposition is evaluated, consists of all derivations
a. that are based on the same numeration and free insertion of G-operator, and
b. that make the same assertion.

One may wonder whether this is sufficient. The seeming counterexample comes from the pronominalization cases. If we assume that the relevant reference set is based on the same numeration, we do not expect a full DP and its pronominal realization to be within the same numeration. One possibility is to treat pronouns as DP ellipses (Elbourne, 2005), or we could formalize pronouns as pronunciation of ϕ-features as suggested in Heim (2008). In both cases, the numeration would contain the full DP. The difference between pronominal or full lexical realization would be realized only in the morpho-phonological component.

Let's now turn to defining the relevant metric. I argue that the evaluation must consider two main factors: (i) grammatical well-formedness of structures (ungrammatical structures cannot enter the comparison), and (ii) pragmatic considerations. The syntactic and pragmatic parameters are listed in (34) and (35), respectively.

(34) Syntax:

a. the reference set may contain only grammatically well-formed structures
b. the optimal structure has the smallest number of movement necessary to obtain an otherwise unavailable semantic interpretation (Reinhart, 1995; Fox, 1995, 2000; Reinhart, 2006)

(35) INTERPRETATION:
a. a presupposed element must be marked as given (either lexically, or by a G-operator) [≈ Maximize Presupposition]
b. a new element cannot be marked as given [≈ Presupposition Failure]

6 Conclusion

Based on word order patterns in Czech I have argued that reordering which relates to information structure arises from the tension between two pragmatic drives and an economy condition on otherwise free movement operation. The syntactic part of the proposal guarantees that only syntactically well-formed structures would be considered. I have argued that movement is dispreferred and is licensed only if it enables an otherwise unavailable semantic interpretation (Reinhart, 1995; Fox, 1995, 2000; Reinhart, 2006). The syntactic output is evaluated with respect to Maximize presupposition (Heim, 1991) and presupposition failure.

My particular implementation consists of a recursive G(iven)-operator which takes a new material as its complement and which adds a presupposition to all upward elements. I have suggested that the operator terminates on an atomic semantic type, which is supported by the facts about domains in which given elements may move. Finally, I have argued that the reference set for purposes of Maximize Presupposition is defined as the set of derivations that have the same numeration and the same assertion.

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The Temporal Interpretation of the Korean *–ko* Construction: Aktionsart and Discourse Context*

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Abstract

The temporal interpretation of the Korean *–ko* construction has been given analyses that assume a construction-specific mechanism (e.g. Yoon 1993, 1994, 1997; Chung 2001, 2005). This paper presents several empirical arguments against these analyses, and develops a compositional analysis. The main point of this paper is that the temporal interpretation of the *–ko* construction can be accounted for in terms of an independently motivated principle regarding the effect of Aktionsart and discourse context on temporal interpretations. Given that Aktionsart and discourse context also govern the temporal interpretation of Korean simple sentences in discourse, I conclude that no construction-specific mechanism is required for the temporal interpretation of the *–ko* construction.

1 Introduction

Korean main clauses bear the tense markers *-nun* (NPST) or *-ess* (PST). However, there are some clauses in Korean where tense morphemes are not obligatory. Nonfinal conjuncts in the *-ko* construction are a case in point as illustrated in (1)[1]:

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[1]In this paper, I use the following glosses: ACC (accusative case), DE (declarative), HON (honorific marker), KO (*-ko*), MOD (modal), NOM (nominative case), NPST (nonpast), PROG (progressive), PST (past), Q (interrogative), and TOP (topic marker).

Grønn, Atle (ed.): *Proceedings of SuB12*, Oslo: ILOS 2008 (ISBN 978-82-92800-00-3), 367–383.

(1) John-i chwumchwu-(ess)-ko, Mary-ka nolayha-ess-t
John-NOM dance-PST-KO Mary-NOM sing-PST-DE
'John danced and Mary sang. '

The nonfinal conjunct of the *–ko* construction is interpreted as having a specific temporal reference despite the lack of a morphological marking. The temporal interpretation of such an untensed conjunct in the *–ko* construction is the central topic of this paper.

Previous studies have attempted to derive the temporal interpretation of the *–ko* construction by means of a construction-specific mechanism. Yoon (1993, 1994, 1997) proposes that the overt tense morpheme of a final conjunct undergoes affix-raising at LF. The affix-raising moves a tense morpheme to a structurally higher position in which it c-commands the nonfinal conjunct. This analysis predicts that two conjuncts are always interpreted as having the same temporal reference. However, as noted by Chung (2001, 2005), this is not the case. In (2), the eventuality of the nonfinal conjunct is interpreted to occur prior to the speech time even though that of the final conjunct is interpreted to occur at the speech time:[2]

(2) John-i cinan hakki-ey nonmwun-ul ssu-ko,
John-NOM last semester-at thesis-ACC write-KO
onul machimnay colepha-nun-ta.
today finally graduate-NPST-DE
'John wrote a thesis last semester and finally he is graduating today.'

In order to account for the fact that this kind of asymmetric temporal interpretation is possible when a time adverbial occurs in the untensed conjunct, Chung (2001, 2005) proposes a phonologically null tense morpheme in the untensed conjunct. However, he does not spell out how the null tense morpheme is temporally interpreted when there is no time adverbial in the untensed conjunct.

This paper shows that Aktionsart and discourse context play a crucial role in the temporal interpretation of the *–ko* construction. They give rise to an implicature between the time intervals denoted by sentences. Based on this observation, I provide a compositional analysis of the *–ko* construction and show how the compositional meaning interacts with pragmatic factors. Given that Aktionsart and discourse context also govern the temporal interpretation of Korean simple sentences in discourse, I conclude that no construction-specific mechanism is required for the *–ko* construction to derive its temporal interpretation, contrary to the previous analyses.

[2]I use Bach's (1981: 69) term 'eventualtiy' to cover all kinds of events and states.

2 Aktionsart and discourse context

This section discusses the effect of Aktionsart and discourse context on the temporal interpretation of sentences in narrative discourse.

2.1 The effect of Aktionsart on temporal interpretations

It has been pointed out that Aktionsart and discourse context give rise to an implicature of the temporal relation between two eventualities. The literature on temporal semantics has shown that this obtains for various languages such as English, French, and Spanish (Dowty (1986), Hinrichs (1986), Partee (1984) for English; Kamp and Rohrer (1983) for French; Cipria and Roberts (2000) for Spanish among others). The relevant semantic notion for this implicature is telicity, which is defined in terms of the subinterval property. Atelic sentences (i.e. states and activities) have the subinterval property whereas telic sentences (i.e. accomplishments and achievements) do not have it. Dowty (1986: 42) characterizes them as below:

(3) a. A sentence *Φ* is **stative** iff it follows from the truth of *Φ* at an interval *I* that *Φ* is true at all subintervals of *I*.
(e.g. if John was asleep from 1:00 until 2:00 pm, then he was asleep at all subintervals of this interval: *be asleep* is a stative.)
b. A sentence *Φ* is an **activity** iff it follows from the truth of *Φ* at an interval *I* that *Φ* is true of all subintervals of *I* down to a certain limit in size.
(e.g. if John walked from 1:00 until 2:00 pm, then most subintervals of this time are times at which John walked; *walk* is an activity.)
c. A sentence *Φ* is an **accomplishment/achievement** iff it follows from the truth of *Φ* at an interval *I* that is false at all subintervals of *I*.
(e.g. if John built a house in exactly the interval from September 1 until June 1, then it is false that he built a house in any subinterval fo this interval: *build a house* is an accomplishment/achievement.)

Dowty (1986) argues that the temporal interpretation in narrative discourse can be accounted for in terms of this subinterval property of an atelic Aktionsart. It gives rise to an implicature such that the atelic proposition is actually true at a larger interval properly including its event time. Due to this potential of an atelic Aktionsart expanding to a superinterval, a temporal overlap with an adjacent sentence is implicated in discourse as in (4a-b). Two successive telic sentences are implicated to be sequentially ordered in discourse as in (4c-d).

(4) a. John entered the president's office. The president sat behind a huge desk.
b. John entered the president's office. The clock on the wall ticked loudly.
c. John entered the president's office. The president walked over to him.
d. John entered the president's office. The president woke up.

(Dowty 1986: 38-39)

These implicatures can be cancelled by discourse context (including world knowledge). For example, the atelic eventuality e_4 does not overlap with the adjacent eventuality e_3 in (5) since the former is the resulting state of the latter.

(5) Jameson entered the room (e_1), shut the door carefully (e_2), and switched off the light (e_3). It was pitch dark around him (e_4), because the Venetian blinds were closed (e_5). (Partee 1984: 254)

2.2 The effect of Aktionsart on the temporal interpretation of Korean simple sentences

The implicatures discussed in the preceding section also arise in sequences of Korean simple sentences in discourse. In her corpus study, E-H. Lee (2007) notes that the Aktionsart of the main predicate contributes to a narrative progression in Korean past tensed sentences in such a way that event descriptions advance the narrative time forward whereas statives do not.

E-H. Lee (2007) utilizes the distinction between events and statives as a criterion for the narrative progression. However, activities do not necessarily lead to the narrative progression. They also allow for overlapping readings between two eventualities (namely, not triggering a narrative progression) as statives. (6a) illustrates the temporal overlap between two activities, and (6b) illustrates the temporal overlap between two statives.

(6) a. John-i chwumchwu-ess-ta. Mary-nun nolayha-ess-ta.
John-NOM dance-PST-DE Mary-TOP sing-PST-DE
'John danced. Mary sang.'

b. Nal-i chwu-ess-ta. Pi-ka nayri-ess-ta.
Day-NOM be.cold-PST-DE Rain-NOM fall-PST-DE
'It was cold. It rained.'

Now, given the fact that activities exhibit the same effect on the narrative progression as statives, the narrative progression should be attributed to telic Aktionsarten (i.e. accomplishments and achievements), not to events (which include activities as well as accomplisments/achievements). Such an effect of atelic Aktionsarten on the narrative discourse is exactly what is predicted by their subinterval property as noted by Dowty (1986). For example, the precedence relation is implicated by successive telic sentences as in (7), where the first and second propositions are an accomplishment and an achievement, respectively. By contrast, the occurrence of an atelic sentence gives rise to an implicature of temporal overlap with a preceding sentence as illustrated in (6), where the two propositions are activities or statives.

(7) John-i nonmwun-ul ssu-ess-ta. Machimnay colepha-ess-ta.
John-NOM thesis-ACC write-PST-DE finally graduate-PST-DE
'John wrote a thesis. Finally he graduated.'

These implicatures are heavily context dependent in Korean just like in other languages. In a specific context, (6a) can also receive a precedence interpretation as in (8):

(8) [Context: John and Mary are participating in a competition. Each artist performs separately.]
John-i chwumchwu-ess-ta. Mary-nun nolayha-ess-ta.
John-NOM dance-PST-DE Mary-TOP sing-PST-DE
'John danced. Mary sang.'

2.3. The effect of Aktionsart on the temporal interpretation of the *–ko* construction

The realization of post-verbal suffixes in the *–ko* construction differs from that in its corresponding simple sentences; (i) the *–ko* marked clause cannot bear a mood marker, and (ii) a tense morpheme is realized optionally as shown below[3]:

(9) John-i chwumchwu-(ess)-(*ta)-ko, Mary-ka nolayha-ess-ta.
John-NOM dance-PST-DE-KO Mary-NOM sing-PST-DE
'John danced and Mary sang.'

Despite this difference, the temporal interpretation available for (9) is exactly the same as its corresponding simple sentences given in (6a). The two atelic propositions give rise to an overlapping reading between the two eventualities by default, but it is also cancellable given a specific discourse context. For example, if the preceding discourse says that John and Mary did the performance together, (9) receives the default overlapping interpretation, but if the same contextual information as (8) is given, (9) receives a precedence interpretation.

[3]There are various post-verbal suffixes in Korean (e.g. a progressive marker *-koiss*, a modal *–keyss*, an honorific marker *–si*,), which are optionally realized in the main clauses as illustrated below:

(i) John-i chwumchwu-koiss-*(ess)-keyss-*(ta).
John-NOM dance-HON-PROG-PST-MOD-DE
'John might have been dancing.'

For the sake of simplicity, I take into account the *–ko* sentences whose final conjunct contains only two obligatory post-verbal suffixes, namely, a tense morpheme and a mood marker. However, the more complicated examples containing the optional suffixes can also be accounted for under my analysis in exactly the same way as the simple cases.

World knowledge is also relevant for these implicatures. In (10a), the overlapping reading arising from two atelic propositions is cancelled by world knowledge because a man cannot perform the two activities of riding a bike and flying at the same time. However, the overlapping reading is available if the individual that performs the activities is E.T., as in (10b):

(10) a. Ku namca-nun cacenke-lul tha-ko, pihang-ul ha-ess-ta.
the man-TOP bike-ACC ride-KO, flight-ACC do-PST-DE
'The man rode a bike and flew.' [Precedence interpretation]

b. [Context: after watching the ending scene of the movie E.T.]
E.T-ka cacenke-lul tha-ko, pihang-ul ha-ess-ta.
E.T-NOM bike-ACC ride-KO, light-ACC do-PST-DE
'E.T rode a bike and flew.' [Overlapping interpretation]

In the next section, I present an analysis that incorporates these findings on the temporal interpretation of the *–ko* construction.

3 A compositional analysis and discourse principle

Section 3.1 analyzes the temporal interpretation of simple sentences. The analysis of the *–ko* construction is presented in section 3.2.

3.1 Simple sentences in Korean

This section shows how to derive the temporal interpretations of the two successive sentences in (6), which are repeated with contextual information in (11):

(11) [Context: John and Mary participated in a couple's contest.]
John-i chwumchwu-ess-ta. Mary-nun nolayha-ess-ta.
John-NOM dance-PST-DE. Mary-TOP sing-PST-DE.
'John danced. Mary sang.'

3.1.1 Syntax and semantics of simple sentences

I formulate my analysis in Combinatorial Category Grammar (CCG). The lexicon required for analyzing (11) is given in (12).[4] The abbreviations used for each syntactic category are as follows: NP_{nom} (nominative NP), S (sentence), S_{-t} (untensed sentence) and S_{+t} (tensed sentence).[5, 6]

[4]The formula AT(t, Φ) means as follows: Φ is true at t (Dowty 1979: 324).
[5]The denotational meanings of case markers and the topic marker are simplified in (12).
[6]A sentence that lacks a tense morpheme is of syntactic category S_{-t} whereas a sentence to which the overt tense morpeme is attached is of syntactic category S_{+t}. A sentence that has a mood marker (and thus can

(12) a. *John* ⊢ NP: John'
b. *Mary* ⊢ NP: Mary'
c. *-i* (nominative case marker) ⊢ $NP_{nom}\backslash NP : \lambda x[x]$
d. *-nun* (topic marker) ⊢ $NP_{nom}\backslash NP : \lambda x[x]$
e. *chwumchwu-* 'dance' ⊢ $S_{-t}\backslash NP_{nom} : \lambda x\lambda t[AT(t,dance'(x))]$
f. *nolayha-* 'sing' ⊢ $S_{-t}\backslash NP_{nom} : \lambda x\lambda t[AT(t,sing'(x))]$
g. *-ess* (past tense morpheme) ⊢ $S_{+t}\backslash S_{-t} : \lambda P\lambda t[P(t) \wedge t<now]$
h. *-ta* (declarative marker) ⊢ $S\backslash S_{+t} : \lambda P[P(t)]$
where *t* is a variable of type *i* and *P* is a variable of type <*i*,*t*> (denoting a set of time intervals (i.e. Stump's (1985) temporal abstract)).

As shown in (12), I assume that a Korean tense morpheme is of semantic type <<*i*,*t*>,<*i*,*t*>> following Stump's (1985) analysis of English tense morphemes.[7, 8] It takes an untensed sentence (of type <*i*,*t*>) and produces a tensed sentence (of type <*i*,*t*>).[9] In other words, a tense morpheme does not change the semantic type of the expression that it combines with, but it just adds further specifications on the temporal relation between the event time and the speech time. For example, the past tense *–ess* specifies that the event time precedes the speech time (i.e. *t*<now) as given in (12).

The combinatory rule required for analyzing (11) is Function Application (FA).[10] It is a basic operation to combine a functor with its argument. The definitions of two types of FAs, Forward FA and Backward FA, are given in (13):

(13) a. Y/X: *f* X: *a* ⊢ Y: *f*(*a*) [Forward FA]
b. X: *a* Y \ X: *f* ⊢ Y: *f*(*a*) [Backward FA]

Now, based on the lexical specifications in (12) and the Function Application rule in (13), the syntax and semantics of (11) can be derived as follows:

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stand alone as an independent sentence) is of syntactic category S. Notice that S_{-t} and S_{+t} are defined in terms of the realization of a tense, and S is defined in terms of the realization of a mood marker.

[7]See Yoo (1996) for an analysis of Korean tenses morphemes (*-ess* and *-nun*) in terms of a temporal abstract; see J. Lee (2007) for further discussion of Korean tense morphemes.

[8]Korean is known to have a relative tense system (e.g. Yoon 1996), but such meanings of tense morphemes are simplified here.

[9]Although tensed sentences and untensed sentences are of the same semantic type <*i*,*t*>, a syntactic feature [± tensed] prevents ungrammatical sentences such as: (i) untensed main sentences, (ii) coordinate sentences in which a final conjunct is untensed, and (iii) sentences in which more than one tense morpheme is attached to the verb as in (i):

(i) * John-i nolayha-nun-nun-ta.
John-NOM sing-NPST-NPST-DE

[10]See Steedman (1996, 2000) for a more detailed introduction to CCG.

(14)

John-i	chwumchwu	-ess	-ta.
John-NOM	dance	PST	DE
NP_{nom}	$S_{-t}\backslash NP_{nom}$	$(S_{+t}\backslash S_{-t})$	$(S\backslash S_{+t})$
: John'	: $\lambda x\lambda t$[AT(t,dance'(x))]	: $\lambda P\lambda t$[$P(t) \wedge t$<now]	: λP[$P(t)$]

———————————————FA

S_{-t}: λt[AT(t,dance'(John'))]

———————————————————————FA

S_{+t}: λt[AT(t,dance'(John')) $\wedge$ t<now]

———————————————————————————FA

S: AT(t,dance'(John')) $\wedge$ t<now

In (14), the one-place predicate *chwumchwu* 'dance' (of type <*e*,<*i*,*t*>>) first combines with the subject NP *John-i* 'John-NOM' (of type *e*) via Function Application, and produces an untensed sentence (of type <*i*,*t*>). The untensed sentence combines with the past tense morpheme *-ess* (of type <<*i*,*t*>,<*i*,*t*>>) again via Function Application, and a tensed sentence (of type <*i*,*t*>) is produced. Finally, the declarative marker *-ta* (of type <<*i*,*t*>,*t*>) takes the tensed sentence (of type <*i*,*t*>), and produces an independent sentence (of type *t*).

In exactly the same way, we can also derive the compositional meaning of the second sentence of (11). The compositional meanings of the two sentences in (11) are given below:

(15) a. AT(t_1, dance'(John')) $\wedge$ t_1<now
b. AT(t_2, sing'(Mary')) $\wedge$ t_2<now

I assume that the locations of the two time intervals in (15) and their temporal relations are determined in discourse as discussed below.

3.1.2 The temporal interpretation of simple sentences in discourse

Dowty (1986:45) proposes the Temporal Discourse Interpretation Principle (TDIP) for a sequence of English sentences in discourse. Based on Reichenbach's (1947) notion of reference time, Dowty (1986) assumes that each sentence has a separate reference time, and that it progresses in a narrative discourse. In his analysis, sentences are always sequentially ordered, but the infererence from the subinterval property of atelic Aktionsarten gives rises to temporal overlap between two eventualities given contextual information.

Building on his insight, I reformulate the principle in accordance with my compositional analysis of Korean simple sentences and the *–ko* construction. As presented in the preceding section, the proposed compositional analysis does not use the notion of

reference time unlike in Dowty (1986).[11] I assume that only the event time of each sentence and the speech time are reflected in the compositional semantics (e.g. Stump 1985), and the temporal relation between two event times is implicated by Aktionsart and discourse context. In what follows, I present the discourse principle that does not introduce a reference time, but utilizes only the event time.[12]

(16) Given a sequence of sentences S_1, S_2, ..., S_n occuring in a narrative discourse, the event time t_i of the sentence S_i (for i such that $1 < i \leq n$) is interpreted:
   a. at a time denoted by time adverbials in S_i, if there are any;
   b. otherwise, by default
      (i) as overlapping with the event time t_{i-1} of the sentence S_{i-1} if either S_{i-1} or S_i is atelic, or
      (ii) as following the event time t_{i-1} of the sentence S_{i-1} if both S_{i-1} and S_i are telic.

Given this principle, the two event times of (15), t_1 and t_2, are implicated to overlap.

Following the treatment of tenses in dynamic semantics (Kamp and Rohrer 1983, Partee 1984, Hinrichs 1986 among others), the time intervals are assumed to be bound in discourse.

(17) $\exists \boldsymbol{t_1} \exists \boldsymbol{t_2}$ [[AT(t_1, dance'(John')) $\wedge$ t_1<now] $\wedge$ [AT(t_2, sing'(Mary')) $\wedge$ t_2<now] $\wedge$ [$\boldsymbol{t_1} \circ \boldsymbol{t_2}$]]

[11]For an analysis utilizing the notion of reference time, see E-H. Lee's (2007) analysis of Korean past-tensed sentences in discourse.

[12]Rather than making a direct reference to the telicity of sentences as in (16), one might prefer to establish a principle that utilizes the subinterval property of atelic sentences as follows:

(i) Given a sequence of sentences S_1, S_2, ..., S_n occuring in a narrative discourse, the event time t_i of the sentence S_i (for i such that $1 < i \leq n$) is interpreted as following the event time t_{i-1} of the sentence S_{i-1}. However, if S_{i-1} or S_i is atelic, temporal overlap between t_{i-1} and t_i is implicated in discourse due to the inference from the subinterval property.

In terms of the effect of Aktionsart and discourse context, this principle is not inconsistent with (16). The way of establishing the principle like (16) is more like Bohnemeyer's (1998, 2002) approach to Yucatec Maya in which the two possible temporal relations (i.e. overlapping and precedence) are equivalently treated in two different principles (i.e. Perfective Principle and Imperfective Principle). By contrast, the principle in (i) is more simliar to Dowty's (1986) approach to English sentences in that every sentence is sequentially ordered but the inference from the subinterval property of atelic Aktionsarten gives rise to the implicature of temporal overlap. These two possible ways of establishing a discourse principle do not make any differences in predicting the temporal interpretation of Korean sentences.

3.2 The –*ko* construction

This section shows that the temporal interpretation of the –*ko* construction can be accounted for in terms of the discourse principle in exactly the same way as the temporal interpretation of two simple sentences in discourse. I argue that there is no need to introduce a construction-specific mechanism for the –*ko* construction contra previous analyses (such as affix-raising and a null tense morpheme). The –*ko* construction that corresponds to the two simple sentences in (11) is analyzed in this section. It is given below:

(18) [Context: John and Mary participated in a couples contest.]
John-i chwumchwu-ko, Mary-ka nolayha-ess-ta.
John-NOM dance-KO Mary-NOM sing-PST-DE
'John danced and Mary sang.'

3.2.1 Syntax and semantics of the –*ko* construction

Given the lexicon in (12), (18) requires only one additional lexical specification, namely that for -*ko*.

In the –*ko* construction, the overt tense morpheme of the final conjunct does not scope over both conjuncts as discussed in the examples like (2). However, the mood marker is interpreted to scope over the whole sentence as exemplified below:

(19) [[[John-i chwumchwu] -ko], [[Mary-ka nolayha] -ess] -ni]?
John-NOM dance -KO Mary-NOM sing -PST -Q
'Did John dance and Mary sing?'

In (19), the whole sentence is interpreted to have an interrogative mood by the occurrence of the interrogative marker -*ni*. Thus, the mood marker should not be analyzed as contained in the constituent conjoined by –*ko* (whereas the tense morpheme should be analyzed as included in the constituent conjoined by -*ko*).

In other words, the conjunction –*ko* conjoins a tensed or untensed sentence (occurring in the first conjunct) and a tensed sentence (occurring in the second conjunct). This different pattern of the tense realization in each conjunct can be captured by a syntactic feature [±tensed] as suggested by Kang (1988)[13]; –*ko* combines with $S_{\pm t}$ (which is of

[13]Even though Kang (1988) utilizes the feature [±tensed] for the syntactic category S, his analysis of the –*ko* construction differs from my analysis in that (i) he assumes that the overt tense morpheme of the final conjunct scopes over the whole sentence, and (ii) he does not adopt Stump's (1985) temporal abstract system. As noted by Chung (2001, 2005) and discussed above, (i) is not a correct generalization. Regarding (ii), section 4 shows that adopting Stump's view is very crucial for understanding the temporal interpretation of the –*ko* construction.

type <i,t>) and produces a *–ko* marked clause. The *–ko* marked sentence is of syntactic category S_{+t}/S_{+t} and is of type <<i,t>,<i,t>> since it combines with S_{+t} and produces S_{+t}. Given that *–ko* combines with $S_{\pm t}$ and produces S_{+t}/S_{+t}, its syntactic category should be $(S_{+t}/S_{+t})\backslash S_{\pm t}$ and its semantic type should correspondingly be <<i,t>, <<i,t>,<i,t>>>.

Following Dowty's (1986:57) insight on English conjunction *and*, I assume that *–ko* is a simple conjunction which does not specify any particular temporal relations between the conjuncts in its lexical meaning (contra Sohn 1999, Cho 2005 for the Korean conjunction *–ko*, and contra Txurruka 2003 for the English conjunction *and*). Based on the data we have observed in the preceding sections, I adopt the view that the temporal relation between eventualities is implicated by the independently motivated discourse principle given in (16). The lexical specification of *–ko* is given in (20). Notice that the temporal variable t_1 denoting the event time of the first conjunct is a free variable (that gets bound only at the discourse level).

(20) *ko* 'and' $\vdash (S_{+t}/S_{+t})\backslash S_{\pm t} : \lambda P\lambda Q\lambda t_2[P(t_1) \wedge Q(t_2)]$
where P and Q are variables of type $<i, t>$, and t_1 and t_2 are variables of type i.

With this lexical specification of *-ko* and those of other expressions given in (12), the syntax and semantics of the *–ko* construction can be derived as in (21). Here again, FA is the only necessary rule for analyzing the *–ko* construction as is the case for a simple sentence.

(21)

John-i	chwumchwu	-ko,
J-NOM	dance	KO
NP_{nom}	$S_{-t}\backslash NP_{nom}$	$(S_{+t}/S_{+t})\backslash S_{\pm t}$
: John'	: $\lambda x\lambda t$[AT(t,dance'(x))]	: $\lambda P\lambda Q\lambda t_2[P(t_1) \wedge Q(t_2)]$

FA

S_{-t}: λt[AT(t,dance'(John'))]

FA

S_{+t}/S_{+t}: $\lambda Q\lambda t_2$[AT(t_1,dance'(John'))) $\wedge$ $Q(t_2)$]

Mary-ka	nolayha	-ess	-ta.
M-NOM	sing	-PST	-DE
NP_{nom}	$(S_{-t}\backslash NP_{nom})$	$(S_{+t}\backslash S_{-t})$	$(S\backslash S_{+t})$
:Mary'	: $\lambda x\lambda t$[AT(t,sing'(x))]	: $\lambda P\lambda t$ [$P(t) \wedge t$<now]	: λP[$P(t)$]

FA

S_{-t}: λt[AT(t,sing'(M'))]

FA

S_{+t}: $\lambda t'$[AT(t', sing'(M')) $\wedge$ t'<now]

FA

S_{+t}: λt_2 [AT(t_1,dance'(J')) $\wedge$ AT(t_2, sing'(M')) $\wedge$ t_2<now]

FA

S: [AT(t_1,dance'(J')) $\wedge$ AT(t_2, sing'(M')) $\wedge$ t_2<now]

I assume that as in simple sentences, the temporal relation between the two event times t_1 and t_2 in (21) is determined in the discourse. They are also existentially bound in the discourse.

3.2.2 The temporal interpretation of the *–ko* construction in discourse

The discourse principle (16b) that pertains to the temporal relation between two successive sentences is also applicable to the *–ko* construction. According to (16), t_1 in (21) is implicated to overlap with t_2 since (21) consists of two atelic sentences.

Finally, existential quantification takes place at the discourse level as in a sequence of simple sentences. The temporal interpretation of (18) is given below:

(22) $\exists \boldsymbol{t_1} \exists \boldsymbol{t_2}[\mathrm{AT}(t_1, \mathrm{dance'(J')}) \wedge \mathrm{AT}(t_2, \mathrm{sing'(M')}) \wedge (t_2 < \mathrm{now}) \wedge (\boldsymbol{t_1} \circ \boldsymbol{t_2})]$

By the implicature of the temporal relation between two time intervals, the event time of the untensed conjunct is temporally interpreted to overlap with the event time of the final conjunct. As a result, the event of John's dancing in (22a) is interpreted to occur in the past with respect to the speech time.

The temporal interpretation of the *–ko* construction consisting of two telic sentences is also enriched in discourse. According to the discourse principle (16), if the *–ko* construction consists of two telic sentences as in (23), the two eventualities are implicated to be sequentially ordered.

(23) a. John-i nonmwun-ul ssu-ko, machimnay colepha-nun-ta.
John-NOM thesis-ACC write-KO finally graduate-NPST-DE
'John wrote a thesis and finally he is graduating.'

b. $\exists \boldsymbol{t_1} \exists \boldsymbol{t_2}[\mathrm{AT}(t_1, \mathrm{write\text{-}a\text{-}thesis'(J')}) \wedge \mathrm{AT}(t_2, \mathrm{graduate'(J')}) \wedge (t_2 \circ \mathrm{now}) \wedge (\boldsymbol{t_1} < \boldsymbol{t_2})]$

By this implicature, the event time of the untensed conjunct is temporally interpreted to precede that of the final conjunct. Consequently, in (23), the event of John's writing a thesis is implicated to occur in the past relative to the speech time.

3.3 Summary

In the preceding section, I showed how the compositional meaning of the *–ko* construction interacts with the independently motivated principle regarding Aktionsart and discourse context. The temporal relation between the event times of two adjacent sentences is compositionally underspecified, but it is implicated in discourse. Such implicatures determine the temporal location of the event time of the untensed conjunct in the *–ko* construction.

This provides a simpler and more elegant account of the temporal interpretation of the –*ko* construction than previous analyses, in that

(i) it does not require any construction-specific mechanism (cf. Yoon's (1993, 1994, 1997) affix-raising at LF),
(ii) it does not postulate a vacuous tense morphology (cf. Chung's (2001, 2005) postulation of a null tense in the untensed conjunct),
(iii) it assumes only one compositional meaning of the conjunction –*ko* (cf. Sohn's (1999) and Cho's (2005) postulation of two –*ko*s depending on the tense realization in the –*ko* marked sentence), and
(iv) it appeals to a general and independently motivated discourse principle (e.g. Dowty 1986).

4 Discussion: a semantic operator in the untensed conjunct?

This section briefly discusses an alternative way of analyzing the -*ko* construction. It will be shown that the analysis of tensed/untensed sentences in terms of Stump's (1985) temporal abstract is crucial in analyzing the temporal interpretation of the –*ko* construction.

In section 3, I assumed that a tense morpheme is of type <<*i*,*t*>,<*i*,*t*>> since it combines with an untensed sentence (of type <*i*,*t*>) and produces a tensed sentence (of type <*i*,*t*>). However, a tense morpheme is standardly assumed to be of type <<*i*,*t*>,*t*> in the literature (Ogihara 1996 among others). In what follows, I will examine whether there are any possible ways to maintain the advantages of my analysis discussed above in a way that are compatible with this assumption.

Under the assumption that a tense morpheme is of type <<*i*,*t*>,*t*>, –*ko* combines with an expression of type *t* when the clause that it attaches to is tensed whereas it combines with an expression of type <*i*,*t*> when the clause it attaches to is untensed. This necessitates two different semantic types (thus, two different compositional meanings) of a single lexical expression –*ko*; (i) if the –*ko* marked conjunct is tensed, -*ko* would be of type <<*t*,<*t*,*t*>>, and (ii) if the –*ko* marked conjunct is untensed, -*ko* would be of type <<*i*,*t*>,<*t*,*t*>>. In order to avoid this undesirable situation in which –*ko* has two different meanings, a semantic operator that changes an expression of type <*i*,*t*> into an expression of type *t* might be posited in the untensed conjunct.

Stump's (1985: 107) existential binder actually plays this role in the temporal interpretation of English sentences. In his analysis, the tensed temporal abstract (of type <*i*,*t*>) is existentially bound and the type *t* is produced at the sentential level. Following Stump, the existential binder might be postulated in the untensed conjunct of the –*ko*

construction. However, the discourse principle (16) can then no longer refer to the event time of the *–ko* marked clause since its event time is existentially bound at the level of compositional semantics under this assumption. This approach would also need to show that the existence of the existential binder is not construction-specific to the *–ko* marked clause.

Chung's (2001, 2005) claim to postulate a phonologically null tense in the untensed conjunct can also be understood in terms of these semantic operators. Although he does not spell out the temporal meaning of the null tense, it can have the same effect as the semantic operator in that it converts an expression of type <*i*,*t*> into an expression of type *t*. In terms of the temporal meaning of the null tense, Chung's proposal might be fleshed out in two ways. The first possibility is to assume that the null tense is ambiguous between past and nonpast. This possiblity, however, cannot account for the following example of the gapping construction: The two eventualities of the *–ko* marked clause in (24) are temporally specified by different time adverbials, but are predicated by the same verb *masi* 'drink' that is modified by a null tense.[14]

(24) Jane-un ecey Mike-nun cikum i swunkan-ey ku cha-lul
Jane-TOP yesterday Mike-TOP now this moment-at the tea-ACC
masi-ø-ko, nayil ku mas-ul uinonha-l-yecung-i-ta.
drink-ø-KO tomorrow the taste-ACC discuss-REL-plan-be-DE
'Jane drank the tea yesterday, Mike is drinking the tea at this moment, and they will discuss its taste tomorrow.'

If the null tense in (24) has a past tense meaning, its cooccurrence with the time adverbial *cikum-i-swunkan-ey* 'at this moment' cannot be accounted for in this analysis. Likewise, if the null tense has a nonpast meaning, it is impossible to account for its cooccurrence with the time adverbial *ecey* 'yesterday' in this analysis.

The other possiblity is to assume that the temporal reference of the null tense is compositionally underspecified but is determined by discourse context. Namely, the underspecified meaning of the null tense receives its value from a contextually salient time, thus its temporal reference can be either in the past or in the nonpast. This underspecified null tense might account for the temporal interpretation of the *–ko* construction, but this approach still needs to answer why its distribution is restricted to the nonfinal conjunct of the *–ko* construction, not in other positions like main clauses and the final conjuncts of the *–ko* construction. This, again, is a construction-specific mechanism posited for the *–ko* construction.

In these respects, the assumption that the tense morpheme in Korean is of type <<*i*,*t*>,*t*> gives rise to many difficulties in analyzing the temporal interpretation of the *–ko*

[14]I would like to thank Yusuke Kubota for inspiring this discussion, and suggesting example (24).

construction. More specifically, this assumption cannot be adopted while maintaining all of the advantages of my analysis (i)-(iii) since it requires one to abandon at least one of them.

5 Conclusion

This paper investigated the temporal interpretation of the Korean *–ko* construction. I argued that the temporal relation between two event times is implicated by Aktionsart and discourse context, and such implicatures determine the temporal location of the event denoted by the untensed conjunct. I spelled out how the compositional meaning of the *–ko* construction interacts with the effect of Aktionsart and discourse context.

Unlike previous studies, my analysis neither posits any construction-specific mechanism, nor does it treat the lexical expression *–ko* in a non-uniform way. It also does not postulate a null tense morpheme. It appeals to the general and independently motivated discourse principle that also governs the temporal interpretation of simple sentences in discourse.

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Contrast For Two *

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Abstract

Bridge accents in German are known for their pragmatic effects. In this paper, these effects are accounted for by a new analysis claiming that bridge accent sentences implicate the possibility of a true statement where both accented elements are replaced by alternatives. This account is compared to the one by Büring (1997) and shown to handle some data in a more accurate way. Finally, an attempt is made to relate the phenomenon intonationally to other phenomena, in particular series and pair-lists, and to show how it could be derived from more basic principles of intonation.

1 Introduction

(1) Die /WEIBLICHEN Popstars trugen \KAFTANE. (Büring, 1994)
The female pop stars wore caftans

The intonational contour shown in the German sentence (1) ('/' indicates a rising pitch accent, '\' a falling pitch accent) is known as *bridge accent*. Sentences with this rise-fall contour underly certain pragmatic restrictions, in particular the following:

- They may not be uttered "out of the blue";
- they are often used in
  - (typically partial) answers to questions or
  - denials/expressions of demur/objections;
- they "activate" (in a way to be further explored) alternatives to the accented phrases.

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This phenomenon is often referred to as *contrastive topic* since the constituent bearing the rise accent can be argued to have the information structural category *topic* and is contrasted with its contextually salient alternatives.

An important subclass of bridge accent sentences which will play a role in this article are *scope inversion sentences* like (2). Scope inversion means that a scope bearing operator somewhere in a sentence takes scope over a preceding scope bearing operator. In the examples, scope inversion is given when the negation outscopes the respective quantifier.

(2) a. /ALLE Politiker sind \NICHT korrupt. (obligatory SI)
all politicians are not corrupt

b. /VIELE Politiker sind \NICHT korrupt. (optional SI)
many politicians are not corrupt

(Büring, 1997)

Many authors have dealt with the bridge accent/contrastive topic phenomenon. One of the most famous accounts is the one by Büring (1997, 1999). The intent of this paper is to point out a few concerns with Büring's analysis and to present a different account which handles the relevant data better.

The following introductory sections aim to provide a sketch of the phenomenon to be dealt with as well as to range it in a set of related phenomena. I then go through Büring's *topic value analysis* and problematic data in section 2. My own *two-alternative analysis* is then presented in section 3. Section 4 finally seeks to shed some light on the intonatory principles behind the bridge accent phenomenon and has a rather tentative nature.

1.1 A closer look at the intonational contour

The connection between the bridge accent and the pragmatic effects described above is less straightforward than it may seem at first glance. On the one hand, a bridge accent is not the only way to reach those effects, and on the other hand, a rise-fall combination does not necessarily always have exactly those effects. In addition, there can be subtle differences in the intonation which lead to a further diversification of the phenomenon.

Jacobs (1997) observed that the real prototypical intonation for the phenomenon he calls *I-Topicalization* (which is more or less our *contrastive topic*) has not a simple rise '/' on the first accent position, but rather a fall-rise '$\surd$', called *root accent*. These two versions are by no means interchangeable; there are cases where one is appropriate but the other is not and vice versa. Space does not allow to go into the details here, so I will mostly ignore the difference throughout this article, but come back to it in sections 1.2.1 and 4.2.

Just as small differences in intonation can make for great differences in meaning and/or felicity, intonations that differ greatly from the bridge contour can be used with more or less the same meaning. All the contours sketched in (3) (and possibly more besides

those) can under appropriate conditions have the effects which have been ascribed to the bridge accent above.

(3) a. √ALle Politiker sind \NICHT korrupt.
all politicians are not corrupt
b. Nicht /AL\le Politiker sind korrupt.
c. /ALle Politiker \sind /NICHT\ korrupt/.
d. ALle Politiker sind /NICHT\ korrupt.
e. Alle Politiker /SIND\ nicht korrupt.

1.2 Other uses of the bridge accent

There are some types of sentences that have a combination of rise and fall accent as their standard way of intonation. Most prominent are conditional compounds (but also other types of compound sentences):

(4) a. Wenn morgen die /SONNE scheint, gehen wir \SCHWIMMEN.
If tomorrow the sun shines go we swim
'If the sun shines tomorrow, we will go for a swim.'
b. Kommt /ZEIT, kommt \RAT.
Comes time comes advice
('If time comes, advice comes' ≈) 'Time will tell.'

This intonational contour is the same bridge accent as above, and its pragmatic effects seem to be more or less the same (in particular the reference to alternatives). The conditional compounds (4) only differ from (1) in that the former do not have a version *without* a bridge accent (or maybe one of the alternate contours from (3)): they always must have the pragmatics that the bridge accent stands for, and so they always must carry a bridge accent, too — as if to avoid a clash between the pragmatics inherent to the construction and the intonation.

A similar case are sentences with *eigentlich* 'actually'. *Eigentlich* seems to have the reference to alternatives built in so deeply that it is not possible to understand it in a way different from that brought about by the bridge accent. Hence it must obligatorily bear a bridge accent (or again one of its "substitutes").

(5) /EIGENTLICH wollte ich ja einen \ROMAN schreiben (, aber ...).
Actually wanted I yes a novel write but
'Actually, I was going to write a novel (at first) (, but ...).'

1.2.1 Pair-lists

Multiple wh-questions and questions containing quantifiers have a so-called *pair-list* reading, which has been extensively discussed in the literature (among others, Szabolcsi,

1997). On this reading, the question asks for pairs of individuals/objects that stand in a certain relation, and the answer gives each pair in a separate sentence, where the two members of the pair have a rise accent and a fall accent, respectively — i. e., the sentences have a bridge accent.

(6) Who danced with whom? (With whom did everyone dance?)

/Hans hat mit \Maria getanzt.
Hans has with Maria danced ('Hans danced with Maria.')

/Karl hat mit \Anna getanzt. (...)
Und /Peter hat mit \Lisa getanzt.

Interestingly, in pair-lists, the rising accent cannot be the 'root' fall-rise accent from section 1.1, but must be a simple rise. Also interestingly, pair-lists can be given in a more connected way with different intonation:

(7) /Hans hat mit /Maria getanzt, /Karl hat mit /Anna getanzt, und /Peter hat mit \Lisa getanzt.

Here, all the falling accents except the last one have been replaced by rises. We will come back to these observations with pair-lists in section 4, where the connection between bridge accents and series intonation is discussed.

2 The topic value analysis

The classical analysis of bridge accents was introduced by Daniel Büring and will be called *topic value analysis* here.

Büring (1997) calls 'topic' any constituent that bears a rise accent, and 'focus' a constituent with a fall accent. Without endorsing this terminology, I will sometimes use these terms as shortcuts in the following.

Büring (1997, 1999) builds on Rooth's (1985) alternative semantics to account for the pragmatic effects of the bridge accent. On top of Rooth's focus values, Büring introduces *topic values* which extend the framework in a straightforward way. While the focus value of a sentence is a set of propositions calculated from the ordinary semantic value of that sentence by substituting the focus by suitable alternatives, the topic value of a sentence is a set of sets of propositions calculated from the focus value by substituting the topic by alternatives.

In short, a sentence S (with a bridge accent) has three semantic values: Its *ordinary* semantic value $[\![S]\!]^o$ (a proposition), its *focus value* $[\![S]\!]^f$ (a set of propositions), and its *topic value* $[\![S]\!]^t$ (a set of focus values).

Assuming that the ordinary semantic value of a question is the set of its possible answers

(cf. Hamblin, 1973), Büring (1997, 178) now states the pragmatic effect of the bridge accent as follows (condition (8-a) will only concern us later):

(8) a. Given a question answer sequence QA, $[\![Q]\!]^o$ must be an element of $[\![A]\!]^t$.
b. Given a sentence A containing a Topic [accent], there must be at least one disputable element in $[\![A]\!]^t$ after uttering A.

A set of propositions is disputable iff it contains "at least one element p ... such that both p and $\neg p$ could informatively and coherently be added to [the common ground] CG" (Büring, 1997, 178). In other words, the truth value of p must not yet be known to the interlocutors. Any disputable set of propositions induced in this way by a bridge accent sentence is called a *residual topic* and may be regarded as a question remaining to be answered.

As an example, take (9):

(9) /HANS mag \FLEISCH.
John likes meat

The topic value is given informally in (10):

(10) $[\![[_{\mathrm{T}}\text{John}]\text{ likes }[_{\mathrm{F}}\text{meat}]]\!]^{\mathrm{t}} = \{\ \{\text{John likes meat, John likes beans, } \ldots\},$
$\{\text{Fred likes meat, Fred likes beans, } \ldots\}, \ldots\ \}$

The first set is the focus value of (9), the other sets are derived by replacing the topic *John* with alternatives. Assume that for Fred it is not known what he likes, then the truth value of e. g. 'Fred likes beans' is open, so the second set in (10) is disputable and can constitute the residual topic: The bridge accent is felicitous.

Thus we have a short strategy for determining whether a bridge accent is licensed on a given sentence: Calculate the topic value, and then look for a proposition of unknown truth value figuring anywhere in that topic value. Such a proposition will render the set containing it disputable, and so this set will constitue a residual topic, which in turn will license the bridge accent. I call this a short strategy because it treats the topic value much like a flat, unnested list of propositions which can quickly be looked through, rather than such a complex thing as a set of sets. Indeed, the nestedness of the topic value seems to play no role for the purpose of licensing bridge accents.

2.1 Problems of the topic value analysis

Elegant though it is, the topic value analysis makes inaccurate predictions in some cases. One rather famous one is the problem of the last answer as discussed e. g. by Krifka (1999); Umbach (2001). In pair-lists, the last pair still bears a bridge accent, even though after uttering it there will be no more open question, i. e. no residual topic.

Büring (2003), a more dicourse-oriented account which nevertheless still makes use of topic values (if called *CT-values* there), solves this problem but not the ones to be discussed below.

Consider a scenario where Fritz is the only person that can have turned on any devices, i. e. there are no alternatives for 'Fritz' in the discourse in (11). Then B's answer is infelicitous:

(11) A: Which devices did Fritz turn on?
B: # /FRITZ hat (unter anderem) das RADIO\ eingeschaltet.
Fritz has among others the radio turned on
'Fritz turned on the radio (among others).'

The topic value of B's answer contains a proposition like 'Fritz turned on the TV set', given that 'TV set' could be a suitable alternative for 'radio'. The truth value of this proposition is unknown, and so we have a residual topic — the bridge accent should be licensed. But intuitively, the bridge accent suggests alternatives to *Fritz*, which we have excluded in this scenario. Maybe an even clearer example is the pair-list (12):

(12) # /FRITZ hat das RADIO\ eingeschaltet, und /FRITZ hat
Fritz has the radio turned on and Fritz has
den FERNSEHER\ eingeschaltet.
the TV turned on

Here, the bridge accent is misplaced even if there are alternatives to Fritz, and intuitively this is due to the repetition of the topic 'Fritz'. Again, the topic value analysis would predict the bridge accent to be well-formed here (modulo the last-answer problem mentioned above).

What seems to go wrong in (11), (12) is that the alternatives alluded to by the topic are completely disregarded: The residual topic is just the focus value of the original sentence, with the topic unchanged and alternatives only to the focus being considered, and this seems not to suffice.

Does it suffice then, the question arises, to consider only alternatives to the topic and leave the focus unchanged? It does not, as (13) shows:

(13) #/FRITZ hat das RA\dio benutzt, und Ma/RIa hat das RA\dio benutzt.
Fritz has the radio used and Maria has the radio used

This sequence is just as odd as (12),[1] and the obvious reason is the same, mutatis mutandis: No alternatives to the focus *Radio* come to play. The fact that there is

[1] To be sure, (i) is fine:

(i) /FRITZ hat das \RADIO benutzt, und /MARIA hat \AUCH das Radio benutzt.

Crucially, the focus accent is on *auch* 'too' here. This means that *auch* in focussed position cancels the

an alternative to the topic generating a residual topic ('Which other persons used the radio?') does not suffice to render the bridge accent felicitous.

Summing up, the data presented here call for an analysis that explicitly makes reference to the alternatives of the focus as well as the topic. Such an analysis will be presented in section 3. But first, let us look at two more issues with the topic value analysis.

2.1.1 Scope Inversion Sentences

The issues presented in this section concern the scope inversion (SI) sentences (2) we saw above, repeated in (14). These are the cases originally discussed by Büring (1997). Recall that sometimes, scope inversion is obligatory, while in other cases it is optional:

(14)	a.	/ALLE	Politiker	sind	\NICHT	korrupt.	(obligatory SI)
		all	politicians	are	not	corrupt	
	b.	/VIELE	Politiker	sind	\NICHT	korrupt.	(optional SI)
		many	politicians	are	not	corrupt	

The fact that (14-a) shows obligatory SI, while in (14-b) it is optional, is accounted for by the topic value analysis: The (unavailable) non-SI reading of (14-a), which can be abbreviated as $\forall\neg$, would leave no residual topic, since all alternative statements (where the only alternative to negation is considered to be affirmation, without any special marking) are either entailed or contradicted by the very strong statement $\forall\neg$.

However, (14-a) implicates that there are corrupt politicians: One who utters the sentence with that intonation wants to say that there are indeed corrupt politicians in his opinion, and he only objects to the claim that it is *all* politicians who are corrupt. This "existential implicature" is not explained by the topic value analysis: It leaves open the possibility that there are no corrupt politicians at all.

The second observation concerning SI sentences relates to the connection between focus values and questions. Recall that both are sets of propositions, so a topic value can be seen as a set of questions (this is also encouraged by Büring). A residual topic, as stated above, is one such question taken from a topic value which has yet to be answered.

Now look back at Büring's discourse well-formedness conditions in (8). Condition (8-a) states that an answer to a question is only legitimate if it contains the question (at least) in its topic value. This means that even if the question is not answered directly or exhaustively, the answer must have "something to do" with the question.

But magine someone asking (15),

(15) Are there (any) corrupt politicians?

requirement for a different focus — which undoubtedly lies in the semantics of *auch*/*too*.

If you are unsure whether there are politicians who are corrupt, but you definitely know about quite a few politicians being absolutely unbribable, you may very well answer (16):

(16) (I don't know, but) /VIELE Politiker sind \NICHT korrupt. (= (14-b))

The intended reading here is of course the reading without scope inversion, so the topic value of (16) is approximately (17) (for a clearer view, (17-b) shows only the relevant part):

(17) a. { {MANY(politician′)(λx[¬corrupt′(x)]), MANY(politician′)(corrupt′)},
{ALL(politician′)(λx[¬corrupt′(x)]), ALL(politician′)(corrupt′)},
{SOME(politician′)(λx[¬corrupt′(x)]), SOME(politician′)(corrupt′)},
{FEW(politician′)(λx[¬corrupt′(x)]), FEW(politician′)(corrupt′)}, ... }
b. { {MANY¬, MANY}, {ALL¬, ALL}, {SOME¬, SOME}, {FEW¬, FEW}, ... }

But this set does not contain the original question, which was {SOME, ¬SOME. According to (8-a), then, this question-answer sequence should be ill-formed.

Furthermore, the topic value does not capture the intuitive notion of "residual topic" in this case. Intuitively, the residual topic (or open question) would be something like 'Which exact number/quota of politicians is corrupt?', i. e. (18).

(18) {FEW(politician′)(corrupt′), 17(politician′)(corrupt′),
1/10(politician′)(corrupt′), HARDLY_ANY(politician′)(corrupt′),
NO(politician′)(corrupt′), ...}

We will see below that the two-alternative analysis presented in the next section can actually capture this intuition.

3 The two-alternative analysis

Starting from the observation that a proposition where either only the focus part or only the topic part is replaced by an alternative seems "not to count" for disputability of a set containing it, I propose an account that incorporates this insight at its very heart.

(19) The two-alternative analysis: A bridge accent on a sentence S conventionally implicates that there is a proposition which is
- •true in the actual world,
- •derived from S by substituting *both* accented elements with *proper* alternatives, and
- •not equivalent to $[\![S]\!]^o$.

This means nothing else than that in uttering (20), one suggests that there is a group of pop stars *other than female* who wore clothes *other than caftans*.

(20) Die /WEIBLICHEN Popstars trugen \KAFTANE. (= (1))
The female pop stars wore caftans

Importantly, the implicated proposition that the two-alternative analysis claims to exist needs neither be uttered in the course of the conversation, nor does the speaker even need to know which exact proposition it is. It suffices that the speaker knows (or is convinced) that there is *some* such proposition. Very often, a bridge accent serves just to indicate this limitedness of a speaker's knowledge, making it clear that the answer or statement given is incomplete information.

Obviously, the problems illustrated in (11) – (13) are solved by the two-alternative analysis, since the insights taken from these examples are explicitly stated there. But also the other issues touched on above are handled by this new analysis.

For the scope inversion data, note first that the two-alternative analysis correctly derives the obligatoriness of scope inversion in (2-a), repeated here as (21):

(21) /ALLE Politiker sind \NICHT korrupt.

For the $\forall\neg$ reading, the implicated proposition would have to figure (a) some quantifier other than 'all' and (b) affirmation instead of negation. But all those propositions must be false since $\forall\neg$ has just been asserted. The only possible quantifier would be 'no', yielding the proposition $\neg\exists$. But this is equivalent to $\forall\neg$ and thus cannot be the implicated proposition. So the reading without scope inversion cannot be available here.

The scope inversion reading $\neg\forall$ is available, though: It implicates a proposition of the form 'Q politicians are corrupt', where Q is some quantifying determiner. Can Q be 'no'? Then the proposition would be $\neg\exists$, which logically speaking is not an affirmation, but a negation, violating the demand for affirmation as the only alternative to negation. This means that (21) implicates that some non-empty proper subset of the politicians are corrupt — exactly the existential implicature from section 2.1.1, which the topic value analysis could not account for.

Finally, reconsider (16), repeated once again:

(22) (Are there corrupt politicians? —)
/VIELE Politiker sind \NICHT korrupt.
(= (16); non-SI reading suggested by context)

The topic value analysis (a) predicted this to be an ill-formed question-answer sequence and (b) derived residual topics that do not seem to conform to intuition. Note first that the two-alternative analysis has nothing to say about discourse well-formedness, so it leaves point (a) up to a different part of the theory, but in any case it does not

reject the sequence (22). Now what would be its prediction concerning (b)? Again, the implicated proposition is of the form 'Q politicians are corrupt'. But this time, Q might very well be 'no', since the proposition MANY¬ is logically not a negation but an affirmation ascribing the property of non-corruptness (or "not being corrupt") to a subset of the politicians.[2] So the implicated proposition derived by the two-alternative analysis will be an answer to the question identified above as the intuitive residual topic, viz. 'Which exact number/quota of politicians is corrupt?'

4 Broader context: series and pair-list intonation

This last speculative section tries to set the intonational contour of the bridge accent in a broader perspective. Certainly, the implicature claimed by the two-alternative analysis cannot be a purely idiosyncratic meaning of this very special bridge contour, but must derive from much more basic intonational principles. I will try to explore some of these in an informal way here.

At first sight, it seems clear that the bridge accent is made up of two building blocks: A rise accent and a fall accent. So it should be informative to first look at these simpler accents in isolation.

Rising accents in German (and many other languages) throughout the literature (e. g. Cruttenden (1986, pp. 99 et seqq.) for English) are linked to what is usually called "openness". The most conspicuous witness to this connection are questions, which are prototypically pronounced with a final rise and are "open" in the sense that they demand for continuation (in the form of an answer), i. e. they typically do not mark the end of a conversation or are at least not intended to. (If a question *is* intended to end the conversation, it is either an invitation to think about the matter or a rhetorical question. In the former case, one could still justly call it open; in the latter case, the usual sense of openness associated with questions is exploited in order to suggest that there really is nothing open about the question at hand.) In a way, questions are "unfinished" propositions, i. e. propositions where some part is missing (if only the truth value or information about the presence or absence of a negation, respectively, as in yes/no questions). So "open" in this sense has about the meaning of "unfinished".

Another way to interpret "open" here is in terms of alternatives: A question is open as to which alterative from a suitable set (the set containing affirmation and negation in the case of a yes/no question) makes the proposition true. In this context it is instructive to look at questions like (23):

[2] This implies that wide-scope (sentence) negation and narrow-scope (constituent) negation are fundamentally different, but still related notions, and interact in special ways. A deeper discussion would be in place, but is beyond the scope of this paper.

(23) a. Hat Fritz das Radio eingeschaltet?
Has Fritz the radio turned on
'Did Fritz turn on the radio?
b. Hat /FRITZ das Radio eingeschaltet?
'Was it Fritz who turned on the radio?'

In the normal yes/no question (23-a), the rising pitch accent will usually be placed on 'Radio', yielding a wide-focus reading according to German accent rules. There is no presupposition as to whether someone turned on the radio or not. In the cleft-type question (23-b) however, the accent is on 'Fritz', which gives rise to the presupposition that someone turned on the radio. In other words, the openness of the question is reduced to alternatives to *Fritz*. This means that the rise accent makes a reference to alternatives in a non-exclusive, or *open*, way.

By contrast, a falling accent *excludes* the alternatives to its carrier.[3] Put differently, it marks the alternative set as *closed*. All in all, the fall accent indeed seems to have the opposite function of the rise accent. We can summarize this in the following table:

(24)

	rise accent	fall accent
general meaning:	signals openness	signals closedness
prototypical usage:	questions	answers/assertions
reference to alternatives:	opens alternative set	excludes alternatives
function in discourse:	requires continuation	marks possible endpoint

Now we can risk a look at what rise and fall accent do in combination. The last line of the table suggests a prototypical use for a rise-fall combination: series.

(25) a. I /came, /saw, and \conquered.
b. I had a /long, /interesting, and \exhausting week.
c. It /rained, we went to /Grünerløkka, and the Pope held a \speech.

In series of conjoined constituents, usually all the items except the last one have a rise accent, while the last item bears a fall (see Bolinger (1989, pp. 205 et seqq.)). This holds no matter what the items of the series are: verbs (25-a), adjectives (25-b), whole sentences (25-c) or any other type of constituent.

Now let us look back at the pair-lists we saw in the introduction (section 1.2.1). Actually, these are instances of a more general pattern, namely *tuple-lists*. Other instances would be triple-lists (26) or quadruple-lists (27):

[3] Only as a default, of course. Focus sensitive operators like 'too', 'only', 'even' and the like modify this meaning, and it would be especially interesting to investigate how they behave in questions. Unfortunately, space does not allow for an adequate discussion in the present paper.

(26) /Hans hat /Maria ein \Buch gegeben.
Hans has Maria a book given. ('Hans gave Maria a book')
/Karl hat /Anna einen \Ring gegeben. 'Karl gave Anna a ring.'
Und /Peter hat /Lisa einen \Korb gegeben. 'Peter turned Lisa down' (lit. 'Peter gave Lisa a basket.')

(27) /Hans ist mit /Maria übers /Wochenende nach \Prag gefahren.
Hans is with Maria over the weekend to Prague gone.
('Hans went to Prague with Maria over the weekend.')
/Karl ist mit /Anna für /einen Tag nach \Paris gefahren. 'Karl went to Paris with Anna for one day.'
(. . .)

A sensible analysis would be that the n-tuples in these sentences constitute *multiple* or *multi-part foci*. Then we have another application of the principle that rising pitch means 'open' or 'unfinished' and falling pitch means 'closed' or 'finished', and we can add another line to the table in (24):

(28) In multi-part foci, only the last part bears a fall accent; all the other parts bear rise accents.

	rise accent	fall accent
multi-part foci:	marks initial focus parts	marks last focus part

But in pair-lists, at least the first rising accent's function seems not to be confined to marking continuation. Rather, it also "opens the alternative set"[4], as I put it above. The alternatives are then addressed in the other sentences. So a rising accent can have several functions at once, it seems.

Now recall (29), which was demonstrated above:

(29) In series, the last item bears a fall accent; all the other parts bear rise accents.

	rise accent	fall accent
series:	marks initial items	marks last item

Now pair-lists (tuple-lists) are nothing more than series where each item has multiple foci. But then (28) and (29) are in conflict: Consider the last member (= focus part) of the first pair (= series item). According to (28), it should bear a fall, but according to (29), it should have a rise. Who wins depends on how closely connected the speaker intends the series to be perceived. A simple series like (25-a) can be uttered with fall accents on each item as in (30) with the effect that the items are perceived in a much less connected way.

[4]It does so in a way slightly different from the way it does questions, of course. A more detailed discussion would be in place, but can not be given here.

(30) I \came. I \saw. I \conquered.

In other words, the "usual" series intonation from (29) puts emphasis on the series, while the intonation in (30) emphasizes each single item. And with the same effects, a speaker can use either way of intonation (6) or (7), repeated in (31), for pair-lists. If the series is intended to be perceived as a whole, the series intonation will be superimposed on the intonation curves of the single items and so overwrite the falling accents.

(31) a. /Hans hat mit \Maria getanzt. /Karl hat mit \Anna getanzt. Und /Peter hat mit \Lisa getanzt.
b. /Hans hat mit /Maria getanzt, /Karl hat mit /Anna getanzt, und /Peter hat mit \Lisa getanzt.

4.1 An explanation?

Can these observations explain the pragmatic effects of the bridge accent in (1) described by the two-alternative analysis? Maybe the bridge accent signals that the sentence is part of an implicit pair-list. At least, this could be the origin of the pattern, which was then conventionalized to the meaning given by the two-alternative analysis. E. g. in the scope inversion sentences from section 2.1.1, an implicit pair-list of which these sentences are part is hard to conceive of. The path of conventionalization just sketched is nevertheless imaginable.

There is still an explanation missing why there must be *two* alternatives, though. The rising accent "opens the alternative set", so there must be alternatives to the "topic", alright. But the "focus"? After all, the falling accent is supposed to "exclude alternatives", so why should it be required that the alternative topic comes with a different focus? The only suggestion I have to offer is a possible implicature based on the Gricean maxim of manner 'Be brief': If Fritz and Maria both used the radio, it would be much more economic to say (32-a) than (32-b), and this might be the reason why (32-b) sounds rather bad.

(32) a. Fritz und Maria haben das Radio benutzt.
Fritz and Maria have the radio used
b. #/Fritz hat das \Radio benutzt, und /Maria hat das \Radio benutzt.[5]

Now when somebody utters (33), which is the first half of (32-b), a hearer can reason: If the speaker thought that other persons used the radio, too, he could have used a sentence like (32-a). But he didn't, so other persons will have used other devices.

(33) /Fritz hat das \Radio benutzt.

When this reasoning is conventionalized, we arrive at the two-alternative analysis.

[5]Cf. fn. 1 for the case that the falling accent is on *auch* 'too'.

4.2 Fall-rise as an emphasized rise

Now, other than objecting that all this is a bit of an oversimplification (which it is, of course, so that objection would be valid for one thing; many details would have to be paid attention to in a serious investigation), one could argue that the pattern in series is not quite the same as the "genuine" bridge accent. We saw in section 1.1 that the prototypical way of pronouncing the bridge accent really has a fall-rise '$\surd$' in the first accent position. But in a pair-list, this fall-rise is impossible (see section 1.2.1). But maybe a fall-rise is an emphasized rise? While in pair-lists there is no need for emphasis, a bridge accent sentence standing on its own may well need a more emphatic rise in order to signal that a contrastive effect is intended. And putting a slight fall before a rise indeed does a good job in this respect: It increases the pitch "distance" covered by the rise and contrasts it to its opposite at the same time.

Another domain where a fall-rise accent is used as an emphasized rise is what could be called *incredulity questions*: When a highly unlikely statement is made, a hearer might react by echoing the statement or the unlikely part of it in form of a question, but with a fall-rise instead of the usual rise.

(34) Stoiber schreibt jetzt für die taz.
'Stoiber now writes for the *taz*.'

Given that Edmund Stoiber is one of the most conservative German politicians and the *taz* is a far-left-wing newspaper, upon hearing (34) one would be very surprised and could ask in an incredulous way (textually this is often reflected by multiple question marks):

(35) $\surd$STOIBER???

5 Conclusion

My main concern for this paper was to show that German bridge accents make reference to alternatives to both of the accented elements, and that proper alternatives to both of those elements are involved in the interpretation of such sentences. Existing accounts, notably the one by Büring (1997), in my opinion pay too little attention to this fact. This is why I took a radically different starting point by wrapping my own theory directly around this observation. In the last section, I then tried to find some independent motivation why this intonation pattern should have come to have this of all pragmatic meanings. Even though not many details have been discussed here, and not all of the assumptions have been motivated thoroughly, I hope that the overall picture is somewhat plausible.

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The Sortal Theory of Plurals *

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Abstract

This paper explores the hypothesis of a semantics for plurals with no atomic partial order defined on the domain of quantification, and thus no ontological distinction between singular and plural individuals. The idea is that the work usually done in the semantics by the atomic partial order is instead done by the syntax, which makes available to the semantics a phonologically covert sortal which provides the suitable granularity. This sortal theory of plurals is compared to the standard atomic theory with the two case studies of partitives and distributivity.

1 The Standard Approach: the Atomic Theory of Plurals

In this Section, I introduce the core assumption of the standard approach to count nouns: that the domain of quantification is endowed with an atomic partial order. I discuss the main properties of this approach and illustrate it with the two case studies of plural partitives and distributivity. Finally, I note that the atomic partial order needs to be supplemented with another non-atomic partial order. This observation will be the starting point for an alternative non-atomic framework, introduced in the next Section.

Core assumptions. The standard approach to count nouns rests on the following assumption (1) concerning the structure of the domain of quantification $\mathcal{D}$.

(1) The domain $\mathcal{D}$ is endowed with a partial order $\leq_{\text{one/many}}$ such that $(\mathcal{D}, \leq_{\text{one/many}})$ is isomorphic to[1] $(\wp^*(\mathcal{A}t), \subseteq)$ for some (unique) subset $\mathcal{A}t \subseteq \mathcal{D}$.

The elements of $\mathcal{A}t$ are called *singular* or *atomic*; those of $\mathcal{D} \setminus \mathcal{A}t \stackrel{\text{def}}{=} \mathcal{P}l$ are called *plural*; singular individuals do not have proper $\leq_{\text{one/many}}$-parts; plural individuals do.[2] Let $+_{\text{one/many}}$ be the operation on $\mathcal{D}$ associated with $\leq_{\text{one/many}}$, namely such that $(\mathcal{D}, +_{\text{one/many}})$ is isomorphic to $(\wp^*(\mathcal{A}t), \cup)$. The denotations of count nouns are constrained as in (2).

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[1] Let $\wp^*(\mathcal{X})$ be the collection of all subsets of the set $\mathcal{X}$, but the empty set.

[2] Let $\leq$ be a partial order on a set $\mathcal{X}$; for every $x_1, x_2 \in \mathcal{X}$, x_1 is a *proper part* of x_2 wrt $\leq$ iff $x_1 < x_2$.

Grønn, Atle (ed.): *Proceedings of SuB12*, Oslo: ILOS 2008 (ISBN 978-82-92800-00-3), 399–413.

(2) For every singular count noun N_{SG} and corresponding plural noun N_{PL}:
a. $[\![\text{N}_{\text{SG}}]\!] \subseteq \mathcal{A}t$.
b. $[\![\text{N}_{\text{PL}}]\!] \stackrel{\text{def}}{=} \text{PL}_{\text{one/many}}([\![\text{N}_{\text{SG}}]\!])$.
where the *plural operator* $\text{PL}_{\text{one/many}}$ returns the closure of $[\![\text{N}_{\text{SG}}]\!]$ under $+_{\text{one/many}}$.

Assumption (1) says that $\leq_{\text{one/many}}$ is an *atomic* partial order. I will thus dub (1)-(2) as the *atomic* theory of plurals (henceforth: ATP). As it stands, assumption (1) says that standard set theory provides a suitable framework for the semantics of plurals. Yet, at the end of this Section, we'll see that assumption (1) needs to be supplemented by positing further structure on the domain of quantification.

Main properties. After Sharvy (1980), let's assume the semantics (3) for the definite article: $[\![\text{the}]\!]$ takes a property; sums up all its elements wrt $+_{\text{one/many}}$; checks whether this sum belongs to the given property; if it does, returns that sum; otherwise, is undefined.

(3) $[\![\text{the}]\!] \stackrel{\text{def}}{=} \iota_{\text{one/many}}$

This semantics for definites yields (4): the singular term 'the boy', if defined, denotes a singular individual; the plural term 'the boys' denotes a plural individual.[3] Thus, the ATP (1)-(2) maps the morphological distinction between singular and plural number into the ontological distinction between singular and plural individuals.

(4) First property: morphology/ontology correspondence.
a. $[\![\text{the boy}]\!] \in \mathcal{A}t$. b. $[\![\text{the boys}]\!] \in \mathcal{P}l$.

Consider next the function $[\![\text{the}^{-1}]\!]$ defined in (5), which takes an individual and returns the set of its $\leq_{\text{one/many}}$-parts (namely, the *ideal* associated with that individual).

(5) $[\![\text{the}^{-1}]\!] \stackrel{\text{def}}{=} \lambda x_e \,.\, \lambda y_e \,.\, y \leq_{\text{one/many}} x$.

The two functions $[\![\text{the}]\!]$ and $[\![\text{the}^{-1}]\!]$ are related as in (6): the property $[\![\text{boy(s)}]\!]$ can be reconstructed from the individual $[\![\text{the boys}]\!]$ by means of $[\![\text{the}^{-1}]\!]$. Thus, the ATP (1)-(2) allows the definite article $[\![\text{the}]\!]$ to be inverted through $[\![\text{the}^{-1}]\!]$.

(6) Second property: invertibility of 'the'.
a. $[\![\text{the}^{-1}]\!]([\![\text{the}]\!]([\![\text{boys}]\!])) = [\![\text{boys}]\!]$.
b. $[\![\text{the}^{-1}]\!]([\![\text{the}]\!]([\![\text{boys}]\!])) \cap \mathcal{A}t = [\![\text{boy}]\!]$.

I now illustrate with the two case studies of plural partitives and distributivity the crucial role played by the invertibility of 'the' in (6).

[3] This statement is not accurate: if a noun denotes a singleton, its corresponding plural definite denotes a singular individual. I assume that this pathological case is ruled out independently, say by a constraint which forbids vacuous application of the plural operator, as in the case of singleton nouns.

First case study: plural partitives. Consider a plural partitive construction such as (7-a). We want the denotation of (7-a) to be equivalent to that of non-partitive (7-b).

(7) a. many of the boys.
b. many boys.

Following Barker (1998) a.o., assume that (7-a) has the structure (8). If 'of_{part}' is semantically vacuous, then (8) yields a type mismatch: definites cannot be fed to determiners.

(8) [many [of_{part} [the boys]]].

The embedded definite article needs to be "gotten rid of", so to speak. A straightforward way to do that is (9): partitive 'of_{part}' denotes the inverse $[\![\text{the}^{-1}]\!]$ of 'the'.[4]

(9) $[\![\text{of}_{\text{part}}]\!] \stackrel{\text{def}}{=} [\![\text{the}^{-1}]\!]$.

By (6-a), assumption (9) guarantees (10), hence the equivalence between (7-a) and (7-b).

(10) $[\![\text{of}_{\text{part}}]\!]([\![\text{the}]\!]([\![\text{boys}]\!])) = [\![\text{the}^{-1}]\!]([\![\text{the}]\!]([\![\text{boys}]\!])) = [\![\text{boys}]\!]$.

Let me wrap up: plural partitives seem to require the semantics to be able to reconstruct the property $[\![\text{boys}]\!]$ from the individual $[\![\text{the boys}]\!]$; this is easy to do within the ATP (1)-(2), by using the inverse $[\![\text{the}^{-1}]\!]$ of the definite article.

Second case study: distributivity. Consider the instance of distributive predication in (11-a). We want to derive truth conditions for (11-a) equivalent to those of (11-b).

(11) a. The boys were wearing a yellow T-shirt.
b. Every boy was wearing a yellow T-shirt.

As argued in Winter (2000) a.o., in order to get the desired equivalence, we need to posit a distributivity operator. Here is a way to define it, using covers. A *cover* is a function $\mathcal{C}$ of type $\langle e, \langle e, t\rangle\rangle$ which satisfies condition (12): it takes an individual x and returns a set of individuals $y_1, y_2, \ldots$ that, if added up using $+_{\text{one/many}}$, return x.

(12) If $\mathcal{C}(x) = \{y_1, y_2, \ldots\}$, then $x = y_1 +_{\text{one/many}} y_2 +_{\text{one/many}} \ldots$

The *distributive operator* can now be defined as in (13): the property $\text{DIST}_{\mathcal{C}}(P)$ is true of a plural individual such as $[\![\text{the boys}]\!]$ iff it is true of every individual in $\mathcal{C}([\![\text{the boys}]\!])$.

(13) $\text{DIST}_{\mathcal{C}} \stackrel{\text{def}}{=} \lambda P_{\langle e,t\rangle} . \lambda x_e . \mathcal{C}(x) \subseteq P$.

[4] An obvious alternative would be to stick to the assumption that 'of_{part}' is semantically vacuous, and posit a type shifter. The difference between these two alternatives is irrelevant to my point.

Assume that the cover relevant for (11-a) is the distributive one, namely $\mathcal{C}([\![\text{the boys}]\!]) = [\![\text{boy}]\!]$. The equivalence between (11-a) and (11-b) is thus trivially derived. Condition (12) entails that $\mathcal{C} \subseteq [\![\text{the}^{-1}]\!]$. By (6-a), condition (14) thus holds: covers have the right granularity, namely a cover of a plurality of boys can only be made up of boys.

(14) $\mathcal{C}([\![\text{the boys}]\!]) \subseteq [\![\text{the}^{-1}]\!]([\![\text{the boys}]\!]) = [\![\text{boys}]\!]$

Let me wrap up: also in the case of distributivity, as in the case of partitivity, the property $[\![\text{boys}]\!]$ needs to be reconstructed from the definite $[\![\text{the boys}]\!]$, in order to get covers of the right granularity, as in (14); this is easy to do within the ATP (1)-(2), since covers come out as subsets of the inverse $[\![\text{the}^{-1}]\!]$ of the definite article.

An extension. Consider the singular partitive (15). Intuitively, 'some' in (15) quantifies over parts of that table. This intuition cannot be captured within the ATP (1)-(2), as it stands: the term 'that table', being morphologically singular, denotes an atomic individual which has no proper parts; thus, there is nothing for 'some' to quantify over.

(15) Some of that table.

A way to cope with this problem is to assume that the individual $[\![\text{that table}]\!]$ does have proper parts after all, but with respect to a partial order different from $\leq_{\text{one/many}}$. Let's denote this new partial order by $\leq_{\text{part/all}}$ and let's revise (1) as (16). Intuitively, $\leq_{\text{part/all}}$ is the relation which holds between that table and one of its legs.

(16) The domain $\mathcal{D}$ is endowed with two partial orders $\leq_{\text{one/many}}$ and $\leq_{\text{part/all}}$ such that $\leq_{\text{one/many}}$ but not $\leq_{\text{part/all}}$ is necessarily an atomic partial order.[5]

We can now let 'some' in (15) quantify over $\leq_{\text{part/all}}$-parts of $[\![\text{that table}]\!]$, as in (17-a). By comparison with the treatment of plural partitives discussed above and summarized in (17-b), we see that this extended ATP handles singular and plural partitives in a unified, elegant way: the two constructions are interpreted in a parallel fashion, using $\leq_{\text{part/all}}$ and $\leq_{\text{one/many}}$, respectively.

(17) a. Singular partitives use $\leq_{\text{part/all}}$.
$[\![\text{some of the boy}]\!] = [\![\text{some}]\!](\{x \in \mathcal{D} \,|\, x \leq_{\text{part/all}} [\![\text{the boy}]\!]\})$.

b. Plural partitives use $\leq_{\text{one/many}}$.
$[\![\text{some of the boys}]\!] = [\![\text{some}]\!](\{x \in \mathcal{D} \,|\, x \leq_{\text{one/many}} [\![\text{the boys}]\!]\})$.

Since Link (1983), (16) and (2) summarize the standard semantics for count nouns.

[5] These two partial orders $\leq_{\text{one/many}}$ and $\leq_{\text{part/all}}$ should be connected by suitable axioms. For example, we might want to require that $\leq_{\text{one/many}}$ be a subset of $\leq_{\text{part/all}}$.

2 An Alternative Approach: the Sortal Theory of Plurals

As seen at the end of the Section 1, the individual ⟦this boy⟧ must be construed as atomic for some grammatical phenomena (say, morphological number) but as nonatomic for others (say, singular partitives). This is the issue of the variability of atomicity. The ATP sticks to the tenet that atomicity is encoded in the ontology, and thus copes with the variability of atomicity by positing two partial orders with different atomicity. In this Section, I pursue a more radical intuition: that the variability of atomicity suggests that atomicity should not be encoded in the ontology in the first place.

Core assumptions. Contra (16), let me assume that the domain of quantification $\mathcal{D}$ is endowed with the unique partial order $\leq_{\text{part/all}}$. In other words, that an atomic partial order such as $\leq_{\text{one/many}}$ is not needed to develop the semantics of count nouns.

(18) The domain of quantification $\mathcal{D}$ is endowed only with the partial order $\leq_{\text{part/all}}$, whose atomicity is left unspecified.

According to the original assumption (2-a), the denotation $[\![\text{N}_{\text{SG}}]\!]$ of a singular count noun N_{SG} is a set of $\leq_{\text{one/many}}$-atoms. This entails that the restriction of $\leq_{\text{one/many}}$ to $[\![\text{N}_{\text{SG}}]\!]$ is empty. I take the latter fact to be the definitional property of the denotation of singular count nouns, as stated in (19-a).[6] My assumption (19-b) on the denotation of plural count nouns is analogous to the original assumption (2-b), with the only difference that the plural operator is defined using the operation $+_{\text{part/all}}$ associated with $\leq_{\text{part/all}}$, rather than the operation $+_{\text{one/many}}$ associated with $\leq_{\text{one/many}}$.

(19) For every singular count noun N_{SG} and corresponding plural noun N_{PL}:
- a. $\leq_{\text{part/all}}$ restricted to $[\![\text{N}_{\text{SG}}]\!]$ is empty.
- b. $[\![\text{N}_{\text{PL}}]\!] \stackrel{\text{def}}{=} \text{PL}_{\text{part/all}}([\![\text{N}_{\text{SG}}]\!])$.

For every singular count noun N_{SG} and corresponding plural noun N_{PL}, let $\leq'_{\text{part-all}}$ be the restriction of $\leq_{\text{part/all}}$ to $[\![\text{N}_{\text{PL}}]\!]$; the following fact (20) holds.

(20) $\leq'_{\text{part-all}}$ is an atomic partial order over $[\![\text{N}_{\text{PL}}]\!]$ with set of atoms $[\![\text{N}_{\text{SG}}]\!]$.

The core difference between the ATP reviewed in Section 1 and the semantics sketched here is as follows: according to the former, atomicity is encoded once and for all in the structure of the domain of quantification through $\leq_{\text{one/many}}$; according to the latter, atomicity is not encoded in the domain of quantification but rather provided each time by a noun which acts as the relevant sortal, thanks to (20). I thus dub this alternative semantics the *sortal* theory of plurals (henceforth: STP).

[6] This assumption might be too strong: isn't a portion of a twig a twig itself? It seems to me that the problem of the denotation of singular count nouns in a nonatomic semantics is intriguingly analogous to the problem of the definition of minimal events or situations, and thus amenable to the same technology.

Main properties. The ATP assumes the semantics for the definite article in (3) and thus maps the morphological distinction between singular and plural number into the ontological distinction between singular and plural individuals, as noted in (4). Within the STP, the semantics for 'the' in (3) must be adapted as in (21), in terms of $\leq_{\text{part/all}}$.

(21) $[\![\text{the}]\!] = \iota_{\text{part/all}}$

By (18), there is no ontological atomicity and thus no distinction among singular and plural individuals Thus, within the STP there is no ontological correlate of the morphological distinction between singular and plural number. Given (20), such a correlation is only possible wrt the denotation of a plural noun, as stated in (22).

(22) First property: morphology/ontology correspondence, relative to a sortal.
   a. $[\![\text{that boy}]\!]$ is an atomic element of $([\![\text{boys}]\!], \leq'_{\text{part}-\text{all}})$.
   b. $[\![\text{those boys}]\!]$ is a plural element of $([\![\text{boys}]\!], \leq'_{\text{part}-\text{all}})$.

As noted in (6), the ATP allows 'the' to be inverted: by applying the function $[\![\text{the}^{-1}]\!]$ defined in (5) to the individual $[\![\text{the boys}]\!]$, we get back the property $[\![\text{boys}]\!]$. Within the STP, the definition (5) of $[\![\text{the}^{-1}]\!]$ must be adapted as in (23), in terms of $\leq_{\text{part/all}}$.

(23) $[\![\text{the}^{-1}]\!] = \lambda x_e \,.\, \lambda y_e \,.\, y \leq_{\text{part/all}} x.$

By applying $[\![\text{the}^{-1}]\!]$ in (23) to the individual $[\![\text{the boys}]\!]$ we get back a property much bigger than $[\![\text{boys}]\!]$, which contains body parts besides whole size boys. Thus, the invertibility of 'the' is not guaranteed within the STP. Given (20), the invertibility of 'the' is only possible wrt the denotation of a plural noun, as stated in (24).

(24) Second property: invertibility of 'the', relative to a sortal.
$\{x \in \mathcal{D} \,|\, x \text{ is a boy among those boys}\} = [\![\text{the}^{-1}]\!]([\![\text{those boys}]\!]) \cap [\![\text{boys}]\!]$.

I now illustrate the STP with the two case studies of plural partitives and distributivity.

First case study: plural partitives. In order to interpret the plural partitive (7-a), the property $[\![\text{boys}]\!]$ must be reconstructed by the time we hit 'many'. As seen in Section 1, within the ATP this can be done in the semantics: we assumed that 'of_{part}' denotes $[\![\text{the}^{-1}]\!]$ and exploited fact (6-a) that $[\![\text{the}^{-1}]\!]$ applied to $[\![\text{the boys}]\!]$ returns the property $[\![\text{boys}]\!]$. Of course, this analysis fails within the STP: $[\![\text{the}^{-1}]\!]$ applied to $[\![\text{the boys}]\!]$ returns a property bigger than $[\![\text{boys}]\!]$, which contains body parts too. Thus, to interpret plural partitives within the STP we need syntax to help out in reconstructing the property $[\![\text{boys}]\!]$. A way to do that is to assume that the proper LF is (25) rather than (8), which has a covert noun 'ones' above the definite. I assume that $[\![\text{ones}]\!] \approx [\![\text{boys}]\!]$.

(25) [many [*ones* [of_{part} [these boys]]]].

Let's stick to the assumption that 'of$_{\text{part}}$' denotes $[\![\text{the}^{-1}]\!]$, as defined in (23). Thus, by applying $[\![\text{the}^{-1}]\!]$ to the individual $[\![\text{these boys}]\!]$ we get the property which contains these boys together with their body parts; by further interseting with $[\![\text{ones}]\!]$, we throw away the body parts and are left with the set of these boys, as desired. In concluion, the hidden noun 'ones' acts like a sortal which provides the relevant granularity.

Second case study: distributivity. In order to check whether a predicate holds distributively of the individual $[\![\text{the boys}]\!]$ means to check whether the predicate holds of all the singular boys. The problem of distributivity is thus analogous to that of partitivity: we need to reconstruct the property $[\![\text{boy}]\!]$ from the individual $[\![\text{the boys}]\!]$. As seen in Section 1, within the ATP this can be done in the semantics: we introduced the notion of a cover $\mathcal{C}$, constrained it in such a way that $\mathcal{C} \subseteq [\![\text{the}^{-1}]\!]$ and noted that this guarantees that covers have the right granularity, namely that $\mathcal{C}([\![\text{the boys}]\!])$ only contains whole size boys. Of course, this analysis fails within the STP: the constraint $\mathcal{C} \subseteq [\![\text{the}^{-1}]\!]$ does not in any way force covers to have the right granularity. Once more, we need syntax to help out by providing the property $[\![\text{boys}]\!]$. Here is a way to do that. Let's assume the version of the copy-theory of movement of Fox (1999), in (26).

(26) a. Copy the DP in the target position and project a binding index i below it:
[DP [i [... [DP ...]]]].
b. Delete the determiner of the copy of the DP remained *in situ*:
[DP [i [... [[$_{\text{DP}}$ ~~D~~ NP] ...]]]].
c. Adorn the NP of the copy remained *in situ* with the same index i:
[DP [i [... [[$_{\text{DP}}$ ~~D~~ NP$_i$] ...]]]].
d. Interpret the stripped copy in situ as a presuppositional sortal, as follows:
$$[\![[_{\text{DP}}\ \text{~~D~~}\ \text{NP}_i]]\!]^{[i\to x]} = \begin{cases} x & \text{if } x \in [\![\text{NP}]\!] \\ \text{undefined} & \text{otherwise} \end{cases}$$

I adopt the definition of covers $\mathcal{C}$ and of the distributive operator DIST$_{\mathcal{C}}$ in (12) and (13), only restated using $+_{\text{part/all}}$ instead of $+_{\text{one/many}}$. I also make the following assumption:

(27) The distributive operator DIST$_{\mathcal{C}}$ is as high as possible in the LF.

Consider sentence (28-a). Assume that the subject 'these boys' is base generated inside VP and then moved out. According to assumptions (26-a)-(26-c), this movement introduces a binding index i and leaves in situ a copy 'these boys', whose determiner 'these' is stripped and whose NP 'boys' is assigned the index i. According to assumption (27), the distributive operator DIST$_{\mathcal{C}}$ sits as high as possible, i.e. not below the binding index between V and the lower copy of the subject but above the binding index between the entire VP and the higher copy of the subject. Thus, we get the LF (28-b).

(28) a. These boys are tall.
b. [These boys$_i$ [$_\beta$ DIST$_{\mathcal{C}}$ [$_\alpha$ i [$_{\text{VP}}$ [$_{\text{DP}}$ ~~these~~ boys$_i$] tall]]]].

Let's now turn to the semantics. By (26-d), the node α gets the interpretation in (29-a). The distributive operator is a universal quantifier, restricted to the cells of the cover. Thus, I assume that its presuppositional behavior is that of universal quantifiers: presuppositions project universally out of it. Hence, the denotation of node β is (29-b), which yields the right truth conditions for (28-a).

(29) a. $[\![\alpha]\!] = \lambda x : [\![\text{boys}]\!](x) \,.\, [\![\text{tall}]\!](x)$.
b. $[\![\beta]\!] = \lambda x : \mathcal{C}(x) \subseteq [\![\text{boys}]\!] \,.\, \mathcal{C}(x) \subseteq [\![\text{tall}]\!]$.

As shown in (29-b), the lower copy of the subject, stripped of its determiner, forces the cover to have the right granularity, namely to only contain whole size boys.[7]

3 Comparison between the two approaches

The ATP and the STP derive the same truth conditions for plural partitives and distributive predication. Yet, they use very different technologies. In this Section, I compare the two apporoaches and try to argue that the new STP is superior to the standard ATP.

3.1 The case of partitives

The STP requires partitives to contain a phonologically covert sortal above the embedded definite. This assumption is not at all new. The syntactic literature which argues for a hidden noun in partitives treats singular and plural partitives on a par; this makes good sense: from the point of view of syntax, we expect no difference between the LFs of 'some of the boys' and 'some of the boy'. Assume that the ATP extended with both $\leq_{\text{one/many}}$ and $\leq_{\text{part/all}}$ were on the right track. Then, also from the point of view of semantics, we would expect no difference between the LFs of singular and plural partitives: as shown in (17), the interpretation of the two constructions is fully parallel, thanks to the two partial orders. Assume instead that the STP were on the right track. Then, we might expect a difference between the LFs of singular and plural partitives: singular partitives can be interpreted straightforwardly by means of $\leq_{\text{part/all}}$, without any need for covert sortals; only plural partitives require a sortal, because of the lack of $\leq_{\text{one/many}}$. I will thus try to build an argument for the STP as follows: I will review from the syntactic literature various arguments for a covert noun in partitives and I will argue that the arguments don't quite hold for the case of singular partitives.

First argument. As shown in (30), partitives indeed allow for an overt noun above the definite. Cardinaletti and Giusti (2006) use this observation as an argument for a

[7] There are of course many issues that need to be settled in order to fully develop this approach, concerning for instance conjoined subjects, pronominal subjects, etcetera. Yet, note that these are not issues that pertain to the STP as implemented here but rather, more generally, to the copy-theory of movement.

covert sortal in plural partitives: "the null hypothesis concerning the [sortal] is that it also occurs when the noun is nonovert".[8]

(30) a. Four of those *pictures* which have been stolen.
b. Four *pictures* of those which have been stolen.

Sauerland and Yatsushiro (2004) a.o. note that singular partitives can be adorned with an overt noun above the embedded definite too, as in (31)-(32). Thus, there seems to be no difference between singular and plural partitives.

(31) a. Some of the stolen amount reappered.
b. Some *money* of the stolen amount reappeared.

(32) a. Most of the book is interesting.
b. Most *content* of the book is interesting.

Yet, an observation made by Cardinaletti and Giusti (2006) might be used to cast some doubt on this conclusion. They note the pattern in (33) and comment as follows: "The lexical items that realize the [higher sortal] and the [embedded DP] must be lexically identical for reasons that are not logically necessary since the same requirement does not hold for [(33-c)]. The fact that this property appears quite generally across languages leads us to assume that the lexical non-distinctness requirement is a UG principle."

(33) a. I have read many *books* of the *books* of the library.
b. *I have read many *novels* of the *books* of the library.
c. I have read many *novels* among the *books* of the library.

This non-distinctness requirement is clearly violated by the singular partitives with an overt sortal in (31-b) and (32-b). I thus tentatively conclude that these cases are not partitives, but rather structures of a different type. These examples thus do not bear on the issue of the existence of a covert sortal in singular partitives.

Second argument. Selkirk (1977) notes an ambiguity with relative clauses in partitives: the several paintings by Sienese artists in (34-a) can be either among the paintings they saw or among the famous paintings in the museum and not necessarily seen by them; the ambiguity is lost in the case of the non-partitive (34-b). Under the assumption (25) that partitives have two nouns, this ambiguity is straightforwardly accounted for: the relative clause can modify either the higher or the lower noun.

(34) a. In the Uffizi they saw many of the famous paintings, several of which were by Sienese artists.
b. In the Uffizi they saw many famous paintings, several of which were by Sienese artists.

[8] But see Martì Girbau (2003, p. 10) for discussion of this argument.

Selkirk only considers plural partitives, such as (34). Let's now turn to singular partitives, by comparing the two pairs (35) and (36). Sentences (35) contain a plural partitive: the relative clause 'most of which . . . ' is ambiguous in the way detected by Selkirk, with no difference between (35-b) with an overt sortal above the definite and (35-a) without it. The case of the singular partitive in (36) is different: the relative clause is ambiguous only in the case of (36-b) with the overt sortal but not in the case of (36-a) without it.

(35) a. In the library, they read some of those books, most of which were interesting.
b. In the library, they read some *books* of those, most of which were interesting.

(36) a. In the library, they read some of that book, most of which was interesting.
b. In the library, they read some part of that book, most of which was interesting.

The contrast between (35) and (36) suggests that there is no sortal for the relative clause to modify in the case of singular partitives, contra the case of plural partitives.[9]

Third argument. Cardinaletti and Giusti (2006) argue that 'ne'-cliticization in Italian provides a further argument for a covert sortal in partitives. The basic pattern of 'ne'-cliticization is illustrated in (37), for the case of a simple, non-partitive noun phrase: (37-c) shows that the cliticized noun cannot occur overt.

(37) a. Gianni ha letto molti libri.
Gianni has read many books
b. Gianni ne ha letto molti $[e]_N$.
Gianni NE has read many $[e]_N$
c. *Gianni ne ha letto molti libri.
Gianni NE has read many books

Let's now turn to the case of partitives. Sentence (38-a) contains a plural partitive and sentence (38-b) contains that same partitive with an overt noun above the embedded definite. The two sentences (38-c) and (38-d) are the same two sentences (38-a) and (38-b) with 'ne' cliticization. In analogy with (37-c), the deviance of (38-d) suggests that what is being cliticized is the noun above the definite. The possibility of 'ne' cliticization in (38-c) thus suggests the existence of a hidden noun above the definite, even in cases where it is not overtly realized.

(38) a. Gianni ha letto molti di quelli [che gli hai consigliato].
Gianni has read many of those [that (you) him have suggested]

[9]Martì Girbau (2003) finds the evidence (34) not conclusive for the existence of a hidden sortal in partitives: "I claim that there is no need to postulate two nouns to account for the ambiguity of relative clauses: assuming Kayne's DP-hypothesis, in partitives there are two determiners that can license a relative clause: the upper one – I assume that nominals are all DPs – and the lower one." Yet, this analysis fails to account for the contrast between (35) and (36), since in both cases of plural and singular partitives we have two DPs. Thus, the contrast between (35) and (36) protects the argument for a hidden sortal in plural partitives based on relative clauses against Martì Girbau's objection.

b. Gianni ha letto molti libri di quelli [che gli hai consigliato].
Gianni has read many books of those [that (you) him have suggested]
c. Gianni ne ha letto molti di quelli [che gli hai consigliato].
Gianni NE has read many of those [that (you) him have suggested]
d. *Gianni ne ha letto molti libri di quelli [che gli hai
Gianni NE has read many books of those [that (you) him have
consigliato].
suggested]

Cardinaletti and Giusti only consider plural partitives, such as (38). Let's now turn to singular partitives. Sentence (39-a) illustrates once more 'ne'-cliticization with singular partitives; sentence (39-b) differs only because the plural partitive has been replaced by a singular partitive, and 'ne'-cliticization turns deviant.[10]

(39) a. Quei libri di linguistica, di cui Gianni ne ha letto molti, sono
those books about linguistics, of whom Gianni NE has read many, are
noiosissimi.
very-boring.
b. *Quel libro di linguistica, di cui Gianni ne ha letto molto, è
that book about linguistics, of whom Gianni NE has read many, is
noiosissimo.
very-boring.

The paradigm (38) shows that 'ne'-cliticization in plural partitives targets the sortal above the embedded definite. Thus, the contrast in (39) shows that there is no sortal to cliticize in the case of singular partitives, contra the case of plural partitives.

A problem. Jackendoff (1977) provides an argument for a covert sortal in partitives based on restrictions on determiners that can head a partitive: as shown in (40-c), 'everyone' but not 'every' can head a partitive; as shown in (40-b), 'everyone' but not 'every' allows for deletion of its restrictor; this correlation suggests that partitives contain a covert sortal and that restrictions on determiners that can head a partitive thus follow from independent restrictions on determiners that allow deletion of their restrictor.

(40) a. John saw every boy. *John saw everyone boy.
b. *John saw every. John saw everyone.
c. *Every of the boy Everyone of the boys.

Exactly the same pattern holds for singular partitives, as shown by the 'no'/'none' alternation in (41). By parity of reasoning, (41) thus suggests the presence of a covert sortal in singular partitives too, contrary to what I have argued for so far.

(41) a. Bill drank no water. *Bill drank none water.

[10] As pointed out to me by Benjamin Spector (p.c.), the same contrast (39) holds for French.

b. *Bill drank no.	Bill drank none.
c. *Bill drank no of the water.	Bill drank none of the water.

Yet, the argument relies on a specific hypothesis on what governs the 'every'/'everyone' and 'no'/'none' alternation, namely that we get 'none'/'everyone' every time the restrictor is syntactically present but phonologically covert. An alternative hypothesis is that we get 'none'/'everyone' every time there is no overt restrictor, either because it is syntactically present although phonologically covert or because it is not syntactically present at all. Under this alternative hypothesis, the paradigms (40) and (41) do not argue for the existence of a covert sortal, and thus do not threaten my claim that singular partitives do not contain it. I leave the issue open for the time being.[11]

3.2 The case of distributivity

The approach to distributivity within the STP sketched in Section 2 uses the tail copy of the subject (and possibly other arguments) to constrain the granularity of the cover used by the distributive operator. I will now defend this approach as follows: I will suggest that subject-predicate number agreement can be used to probe the content of the copy of the subject left in situ in [Spec, VP]; I will then use this probe to argue that the content of the copy does indeed control the granularity of the cover.

Preliminaries on agreement in BE. A singular collective noun in British English (henceforth: BE) can trigger both singular and plural VP-agreement, as shown in (42).

(42) A committee of students was/were holding a meeting in here.

Elbourne (1999) notes two restrictions on plural agreement with collective nouns in BE: only singular agreement is possible in the case of the 'there'-construction (43) and in the case of the narrow scope reading of the indefinite collective subject in (44).

(43) There was/*were a committee holding a meeting in here.

(44) a. A northern team *is* likely to be in the final. $\exists >$ likely, likely $> \exists$

[11] Note crucially that the morpheme 'one' in 'everyone' and 'none' cannot be interpreted as the realization of the deleted restrictor. This can be seen in two ways. First, by noting that 'none' would then be inconsistent with a mass interpretation of singular partitives, contra (41-c). Second, by noting that an alternation analogous to that of 'every'/'everyone' is displayed by Italian 'qualche'/'qualcuno', as shown in (i), and that 'ne'-cliticization is possible with 'qualcuno', as shown in (ii).

(i) a. Ho visto qualche ragazzo. *Ho visto qualchuno ragazzo.
b. *Ho visto qualche. Ho visto qualcuno
c. *Ho visto qualche di loro. Ho visto qualcuno/ognuno di loro.

(ii) a. *Gianni ne ha letto qualche libro.
Gianni NE has read some book
b. Gianni ne ha letto qualcuno
Gianni NE has read someone.

b. A northern team *are* likely to be in the final. $\exists >$ likely, *likely $> \exists$

Here is a way to account for the facts in (42)-(44). Let me assume that number VP-agreement is always established with the copy of the subject in [Spec, VP]:[12] plural (singular) VP-agreement corresponds to a plural (singular) copy in [Spec, VP]. Thus, what's special about BE is that a singular collective subject can leave in situ in [Spec, VP] a plural copy. There might be many ways in which this might happen; for concreteness, here is a possible way. Barker (1998) suggests that "a count noun will be a [collective] noun just in case it can take an 'of' phrase containing a plural complement, but not a singular complement." Let me assume that this plural PP complement is always present at LF, even when it is not overtly realized. Thus, the copy left in situ in [Spec, VP] by the singular collective subject of (42) is (45).

(45) [a [committee [of [students]]]].

By step (26-b) of the definition of movement, the copy of the subject in [Spec, VP] is stripped of a bit of its left periphery, in order to avoid a type mismatch. In the case of a copy with a complex left periphery such as (45), we then have to ask how much of the left periphery is deleted: just the upper determiner or a bit more? Let me suggest that what's special about BE collective nouns is that both options are available, as in (46).

(46) a. [~~a~~ [committee of [students]]].
b. [~~a~~ [~~committee~~ ~~of~~ [students]]].

In the case of (46-a), [Spec, VP] contains the singular property 'committee of students', which thus triggers singular VP-agreement; in the case of (46-b), [Spec, VP] contains the plural property 'students', which thus triggers plural VP-agreement. The ban on plural agreement in the 'there'-sentence (43) follows from the fact that the subject does not move in 'there'-sentences and thus there is no lower copy that can be stripped of its left periphery as in (46)b in order to obtain a plural property in [Spec, VP]. The same analysis applies to (44), under the assumption that the narrow scope reading for the indefinite subject is obtained by reconstructing the subject into its base position. In conclusion, agreement in BE can be used to access the tail copy of the subject.

Distributivity and agreement. Let me point out one more restriction on plural agreement with singular collective subjects in BE: as shown in (47), plural agreement is required in the case of the inherently distributive predicate 'to be odd'.[13] Let me show that this restriction follows straightforwardly from the assumptions I have in place.

(47) a. *This set of numbers *is* (all) odd.
b. This set of numbers *are* (all) odd.

[12] VP-agreement with the copy in [Spec, VP] might happen either by T probing down into VP or by V agreeing with its specifier; the details of the agreement operation are irrelevant here.

[13] The judgment reported in (47) was provided to me by Paul Elbourne (p.c.).

The two sentences (47) correspond to the two LFs (48) respectively, which only differ wrt the amount of left periphery deleted in the copy of the subject left in [Spec, VP].

(48) a. $[_{\text{IP}}$ [This set of numbers]$_i$ $[_{\alpha}$ DIST$_{\mathcal{C}}$ $[_{\text{VP}}$ [~~this~~ set of numbers]$_i$ $[_{\text{V}}$ be odd]]]].
b. $[_{\text{IP}}$ [This set of numbers]$_i$ $[_{\alpha}$ DIST$_{\mathcal{C}}$ $[_{\text{VP}}$ [~~this set of~~ numbers]$_i$ $[_{\text{V}}$ be odd]]]].

According to the theory of predication developed within the STP in Section 2, the denotation of the nodes α of these two LFs (48-a) and (48-b) are those in (49-a) and (49-b), respectively. The denotation of node α in (49-b) yields the right truth conditions for the fine sentence (47-b) with plural agreement. Assume that what makes 'odd' inherently distributive is the fact that the intersection between $[\![\text{odd}]\!]$ and $[\![\text{set of numbers}]\!]$ is empty.[14] Hence, the denotation of node α in (49-a) is always empty and the deviance of sentence (47-a) with singular agreement thus follows.

(49) a. $[\![\alpha_{(48a)}]\!] = \lambda x{:}\mathcal{C}(x) \subseteq [\![\text{set of numbers}]\!] \,.\, \mathcal{C}(x) \subseteq [\![\text{odd}]\!]$.
b. $[\![\alpha_{(48b)}]\!] = \lambda x{:}\mathcal{C}(x) \subseteq [\![\text{numbers}]\!] \,.\, \mathcal{C}(x) \subseteq [\![\text{odd}]\!]$.

Let me wrap up. According to the STP, the copy of the subject left in situ, stripped of its determiner, provides the granularity of the corresponding cover. According to the account for BE agreement sketched above, verbal number morphology in BE provides a way to access the content of the lower copy. I have thus used agreement in BE to support the claim that the the granularity of the cover is controlled by the tail copy.

Distributivity and movement. Ferreira (2005) and Kratzer (in progress) claim that a predicate can apply distributively to an argument only if that argument has undegone movement. Suppose this claim is right: why are syntax (movement) and semantics (distributivity) connected in this way? The ATP does not shed any light on this connection: distributivity is implemented entirely within the semantics, since the right granularity of the cover can be guaranteed using the atomic partial order $\leq_{\text{one/many}}$. The STP would instead provide a rationale for this connection between movement and distributivity: in order to apply a predicate distributively to the individual $[\![\text{the boys}]\!]$, we need to reconstruct the property of singular boys; because of lack of the atomic partial order $\leq_{\text{one/many}}$, this cannot be done in the semantics; as suggested in Section 2, the only option is to move out the argument 'the boys' and use the copy '~~the~~ boys' it leaves in situ as the relevant sortal.[15]

[14] There are a variety of ways to derive this condition, all compatible with my proposal. One strategy is to assume that 'set of numbers' denotes pluralities of numbers and that 'odd' has a non-cumulative denotation, which only contains singular numbers. Another strategy is to assume that 'set of numbers' denotes special individuals which are different from any plurality of numbers and that 'odd' is a (possibly cumulative) property of numbers.

[15] In particular, Ferreira argues that the distributive operator is part of the rule for the interpretation of the binding index produced by movement. This assumption derives my assumption (27) that the distributive operator sits above the binding index.

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Analyticity under Perspective: Indefinite Generics in French*

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Abstract

Starting from the observation that a sentence like *??a dog is intelligent* is difficult in the generic domain in the same way as *??a student is shy* is in the existential one, this paper argues that as for the existential reading, the generic interpretation of the indefinites also needs a "context". Adopting an explicit modal interpretation of GEN, our account builds on Greenberg (2002) insight that indefinite generic sentences require a special kind of modal bases. After pointing out some shortcomings of Greenberg's theory, we propose an account of *point of views* as restrictors of modal bases. We represent point of views as world-judge pairs *à la* Ross (1997) and show that, besides modals, which always rescue indefinite generic sentences different phenomena like contrast, focus, evaluative adverbs and evidential uses of propositional attitude verbs are also manifestations of point of views.

1 Introduction

Since the work of Attal (1976), it is recognized[1] that the existential interpretation of indefinites in French can only be obtained in thetic sentences (Kuroda, 1975) with presentational predicates.

(1) a. ??Un élève est timide / *A student is shy*
b. Un élève est entré / *A student came in*

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[1] See, e.g. Dobrovie-Sorin, 1995 and for English, Ladusaw, 1994; McNally, 1996 and Glasbey, 1998.

Grønn, Atle (ed.): *Proceedings of SuB12*, Oslo: ILOS 2008 (ISBN 978-82-92800-00-3), 414–429.

It is also assumed that the generic reading of indefinites is obtained precisely in the absence of a situational parameter. This is always the case with i-level predicates (Chierchia, 1995), which are considered to be inherently generic. Classically, GEN is treated as an unselective quantifier *à la* Lewis (Lewis, 1975), which relates a restrictor and a matrix. The variables in the restrictor are bound by GEN and thus get their generic reading. The theory generates as acceptable (2a) – (3a) whose LFs are in (2b) – (3b).

(2) a. ??Un chien aboie (generic reading) / *A dog barks*
b. GEN x [dog(x)][barks(x)]

(3) a. ??Un chien est intelligent (generic reading) / *A dog is intelligent*
b. GEN x [dog(x)][intelligent(x)]

However, speakers consider (2a) and (3a) very difficult, the same way as (1a) is. They often tend to add some extra material, as, for instance, noun modifiers, focus, contrast, attitude verbs, and frequency adverbs. These additions are not innocent and need close investigation.

It is worth noting that this difficulty is related to indefiniteness. French plural definites, which correspond to bare plurals in English (Dobrovie-Sorin, 2007), are usually contrasted with indefinites, cf. (4a-b).

(4) a. Les chiens aboient / *Dogs bark*
b. Les chiens sont intelligent / *Dogs are intelligent*

The difference between generic indefinite sentences and plural definites has been traditionally related to the distinction analytic vs. synthetic judgments. It has also been put forward that the first ones are only compatible with essential properties, whereas the second ones can support non-essential ones (Dähl, 1975; Burton-Roberts, 1977; de Swart, 1991).

However, Greenberg (2002) has recently argued that indefinite generic sentences are not necessarily associated with essential properties (*A carpenter earns very little*). Nonetheless, the author maintains that indefinite generics do not require verifying instances and express a law that does not rely on induction. In an explicit modal framework, Greenberg has expressed the distinction between indefinite generic sentences and generically interpreted bare nouns by identifying two types of restrictions on modal bases (Kratzer, 1981) with respect to which the proposition expressed by the two types of sentences are true.

We build on this insight, show that Greenberg choice of accessibility relation is not entirely accurate and propose a different criterion for restricting the modal basis, which relies on *point of views* (known as *media* (Ross, 1997)). Technically, they are implemented as world-judge pairs and are sets of content coherent propositions, for a

given judge. *Point of views* legitimate generic indefinites. Different syntactic, lexical and discursive strategies can serve this purpose.

The paper is structured as follows. We present in section 2 some strategies that speaker use to rescue indefinite generic sentences and discuss in section 3 two accounts of indefinite generic sentences dedicating a particular attention to Greenberg's theory. In section 4 we first present our account (section 4.1) and then come back to the data (section 4.2). The aim of the paper is to indirectly argue that indefinites, no matter whether existential or generics, need to be legitimated, and point of views, as sets of world-judge pairs, fill this task. That indefinites need an anchoring context is a robust observation for French, which cuts across existential readings, generics, and predicative uses (Mari and Martin, 2008b).

2 Rescuing strategies

To rescue (2a) and (3a), speakers overwhelmingly rely on contrast, by using appropriate prosody. As we argue in the rest of the paper, this is not an innocent feature. Together with discursive strategies that enable the use of indefinite generic sentences, they explain the conditions of their felicity.

2.1 Modification?

It has been argued that if the subject NP is modified, sentences are better accepted. Some authors (e.g. Heyd, 2002; Dobrovie-Sorin and Mari 2007) have proposed that only stage level predicates (Carlson, 1977) can rescue the sentences and assume with Rooth (1995) that they give rise to *when/if* paraphrases. (5a) is considered acceptable since *malade* (*sick*) introduces an event, whereas *intelligent* does not (6a).

Close investigation of the data shows instead that both stage (5b) and individual level predicates (6b) can be used, provided that a contrastive topic (CT) is put in place by appropriate stress (see for C-contour in French, Beyssade, Marandin, Rialland, 2003). In most of the cases, the comment part also contains a focused constituent. Both (5) and (6) can be typically used as an answer to: "Qui est comment?" / *Who is how ?* and its subquestion: "Quel type d'enfants est comment?" *What kind of children is how?*[2] (With

[2]Heyd (2002) has also argued that non predicative adjectives cannot be used as NP-subject modifier. The examples are hers.

(i) *Un éléphant est d'Afrique / *An elephant is African*
*Un éléphant d'Afrique a une corne / *An African elephant has a horn*
(NB « avoir une corne » is not an essential property of the elephant)

Again, if appropriately focused, these modifiers can also rescue the sentence.

Büring (2003) we assume that focus is needed when alternatives are left open by the relevant constituent in the question).

(5) a. ??Un enfant malade est grincheux / *A sick child is fussy*
b. [Un enfant MAlade$_F$]$_{CT}$ est [GRINcheux$_F$]$_{COMM}$

(6) a. ??Un enfant intelligent est renfermé / *An intelligent child is shy*
b. [Un enfant INTelligent$_F$]$_{CT}$ [est RENfermé$_F$] $_{COMM}$

2.2 More on contrast

Similarly, when the contrast is overtly expressed, the sentence is unproblematic, provided that appropriate stress is used. Assuming that the question under discussion is 'what kind of animal is intelligent?' (intelligence is *given*), here are two possible answers.

(7) [Un CHIen$_F$]$_{CT}$ [est intelligent]$_{COMM}$, [un CHAT$_F$]$_{CT}$ [_ NON$_F$]$_{COMM}$
A dog is intelligent, a cat is not

(8) [Un CHIen$_F$]$_{CT}$ [est intelligent]$_{COMM}$, [un CHAT$_F$]$_{CT}$ [_ AUSSI$_F$]$_{COMM}$
A dog is intelligent, cat too

As is well-known, focus in CT introduces the presupposition that there are other alternatives for the focused value (e.g. Rooth, 1985, Büring, 2003). The N can be simply focused as well. In this case, the contrastive categories are accommodated, a (costing[3]) procedure which, again, can be used felicitously in appropriate discourses.

(9) A: Les enfants, qu'est-ce qui miaule? / *Boys, what is that meows?*
B: [Un CHAT$_F$] $_{CT}$ [miaule] $_{COMM}$ / /*A CAT meows*

2.3 Propositional attitudes

When the sentence is embedded under a propositional attitude verb, its acceptability is restored, with some constraints though. It has first to be noted that lexical differences between verbs matter. *Trouver* (*find*) support evaluations (10a) better than *croire* (10a). *Croire* can support questions about a fact as in (10c), which, besides a salient existential reading can be interpreted generically; *trouver* does not support facts under any circumstances (10d).

(10) a. ?Je crois qu'un chien est intelligent / *I believe that a dog is intelligent*

(ii) Un elephant D'AFRIQUE a une corne / *An African elephant has a horn*

[3]It is worth noting that the strategy is costing, and that speakers might prefer to use a straightforward expression, with definite plurals, for instance.

b. Je trouve qu'un chien est intelligent (Ducrot, 1975) / *I find that a dog is intelligent*
c. Je crois qu'un chien aboie, non? / *I believe that a dog barks, isn't it?*
d. *Je trouve qu'un chien aboie, non? / *I find that a dog barks, isn't it?*

Trouver does not support mathematical truths (*#Je trouve que 2+2=4*) or, more generally, propositions that can be ascertained as true or false by adding evidence. In other terms, *trouver* only signals the personal view of the speaker leaving open the possibility that contradictory propositions are supported by different judges in the same world[4].

Similarly, the behavior of *croire*, which is preferably used in approval-requesting-questions, highlights the fact that the assertion it introduces cannot be freely added to the common ground.

When focused, *savoir* (*know*) can be used to embed indefinite generic sentences with an evaluative predicate.

(11) a. *Je sais qu'un chien est intelligent / *I know that a dog is intelligent*
b. Je SAIS qu'un chien est intelligent

(11a) has two interpretations: (i) the speaker claims, contrary to the hearer, that a dog is intelligent, or (ii) the speaker makes clear that, contrary to what the hearer seems to hold, (s)he is aware of the fact that a dog is intelligent. In these two cases, *savoir* has an evidential use, i.e. indicates (a) the source of the evidence is given as well as (b) the degree of confidence (Fogelin, 1967 and later Simons, 2007).

Summing up, in all acceptable cases in (10)-(11), a *polyphonic* (Ducrot, 1984) context is put in place, in which the truth of the generic sentence holds for one of the participants of the conversation only.

2.4 Frequency adverbs

Besides frequency adverbs (12), which have been convincingly analyzed as counting events in which the co-occurrence of the properties expressed by the NP subject and the VP is observed (e.g. Rooth, 1995; de Swart, 1991), other adverbs, called expectation adverbs, can also improve the acceptability, cf. (13). The event-counting theory cannot explain their behavior, though.

(12) Un chien est souvent intelligent / *A dog is often intelligent*

[4]In a similar vein, Stephenson (2006) suggests that *find* can only express an evaluation that is bound to the attitude holder.

(13) [Un chien]$_{TOPIC}$ [est [SANS doute]$_F$ intelligent]$_{COMM}$ / *A dog is, without any doubt, intelligent*

2.5 Modalities

Generic indefinites have been noted as not problematic in modal sentences (Dahl, 1975 ; Burton-Roberts, 1977 ; de Swart, 1996 ; Heyd, 2002 ; Dobrovie-Sorin and Mari, 2007). It has been suggested by Dobrovie-Sorin and Mari (ibid.) that modals indirectly induce quantification over events. However, the intuition and the formal details are obscure and we prefer to adopt a more classical view of modality à la Lewis/Kratzer, as only inducing quantification over worlds. It is to be noted that evaluative and factives can be used under a modal.

(14) [Un chien]$_{TOPIC}$ [[peut$_F$] être intelligent]$_{COMM}$ / *A dog can be intelligent*

(15) [Un [étudiant]$_F$]$_{CT}$ [[peut$_F$] travailler dans cette salle]$_{COMM}$
A student is allowed to work in this room

2.6 Circumstances

For completeness sake, it is worth noting that indefinite generics with a non-evaluative predicate are also better accepted if a frame is provided, which is in a causal relation with the content of the generic sentence.

(16) Un chien aboie lorsqu'il a faim / *A dog barks when he is hungry*

Before we discuss current theories of indefinite generics and propose our account, we narrow down the scope of the paper. Firstly, we pay a special attention to evaluative predicates. We do not mention either the constraints pending on plural indefinites (see Dobrovie-Sorin and Mari, 2007; Mari and Martin, 2008a). Finally, we do not consider *ce* constructions (*Un chien,* c'*est intelligent*) which would require a lengthily discussion *per se* (see Carlier, 1996).

3 Parameters for the interpretation of indefinite generics

GEN has been often interpreted in modal terms (Krifka *et al*. 1995). Under the classical account, as pointed by Greenberg (2002), the interpretation of generic indefinites ((2a) or (3a)) and bare plurals (4) (plural definites in French) coincide.

Let M = <A,W,R,f>, where A is a set of entities, W a set of worlds, R an accessibility relation of maximal similarity and f an assignment function. The explicit modal interpretation of GEN (17a) is in (17b).

(17) a. GEN x [P(x)][Q(x)]
b. ∀w' [[w' R w] → ∀x [[P(x,w')] →[Q(x,w')]]]

The classical interpretation has been amended in various ways to capture the interpretation of generic indefinites specifically. The first amendment we discuss is the one involving quantification over events.

3.1 Quantification over events

It has been argued that GEN can bind either individuals or events (e.g. Chierchia, 1995; de Swart, 1991). Some authors have distinguished GEN from HAB, but the details of this distinction are not unequivocally settled in the literature. For most of the authors, GEN (or its HAB version, in this case) counts events and thus binds event variables. This seems to straightforwardly apply to frequency adverbs. In (12), *souvent* (*often*) is taken to count situations in which the intelligence of the dog can be observed. The same treatment is probably suitable for case (16). It has also been proposed to extend it to cases with modified subject NP that can be paraphrased by a *when* clause (Heyd, 2002; Dobrovie-Sorin and Mari, 2007). In the LF for (5), repeated in (19), GEN is taken to count events, and individuals are only indirectly bound to events by the Skolem function f (see Dobrovie-Sorin and Beyssade, 2004).

(18) Un enfant malade est grincheux / *A sick child is fussy*
∃ f GEN e [sick(e) & child (f(e))][fussy(f(e))]
∃ f ∀w' [[w' R w] → ∀e [[P(e,w') & S(f(e))] →[Q(x,w')]]]

Even assuming that this representation only cover the relevant cases, some major concerns remain. **1**. It simply represents the sickness as the *occasion* in which a child is fussy, and the causal link between the property being sick and the property being fussy, is lost. **2**. It generates as appropriate sentences such as

(19) #Un garçon est intelligent dans un train / *A boy is intelligent in a train*

where *in the train* provides the event in which being a child and being intelligent are verified. The sentence can be acceptable, though, if a causal link between *being in the train* and *being intelligent* is assumed.

3.2 'In virtue of' accessibility relation

Greenberg takes seriously the fact that indefinite generics are bounded to the expression of laws of a nature different than the simple co-occurrence of two events (along the lines of the tradition which states that indefinite express analytic laws) or the repetition of the manifestation of a property in certain circumstances. However, in view of the fact that they do not necessarily require essential properties, e.g. *a carpenter earns very little*, Greenberg looks for a new criterion for the use of indefinite generics.

Greenberg argues that indefinite generics and generic bare plurals give rise to two different kinds of interpretations that can be teased apart by distinguishing two different kinds of accessibility relations. Greenberg starts from the three following minimal pairs.

(20) a. *A room is square
b. Rooms are square

(21) a. A Norwegian student whose name ends with ‘p’ wears green socks
(∃ salient)
b. Norwegian students whose name ends with ‘p’ wear green socks

(22) a. *An Italian restaurant is closed tonight
b. Italian restaurants are closed tonight

The author labels indefinite generic sentences and bare plural generics as IS and BE sentences respectively. BE sentences are claimed to express regularities which are expected to hold in worlds maximally similar to ours and express descriptive (inductive) generalizations. The classical interpretation of GEN holds for bare nouns and is repeated below, where R is maximal resemblance.

(23) A BE sentence is true in w iff:
$\forall w'$ [[w’ R w] $\rightarrow \forall x$ [[P(x,w’)] $\rightarrow$[Q(x,w’)]]]

Contrary to BE sentences, IS sentences are claimed to only be able to express "in virtue of” generalizations, i.e. deductive generalizations. The modal interpretation of indefinite generics accommodates a property in virtue of which the generalization holds. The accommodated property (*S*) is "associated" to the NP property (*P*). The notion of association is defined as in (25):

(24) Association: *S* is associated with *P* in w iff $\forall x[P(x) \rightarrow S(x)]$ holds in all worlds epistemically/deontically/stereotypically accessible from w

The use of IS sentences is governed by the following rule:

(25) An IS sentence is true in w iff
$\exists$ S $\forall w_{\cdot}[\forall x[[P(x,w_{\cdot})] \rightarrow [S(x,w_{\cdot}) \wedge$ S is associated with P]] $\rightarrow$
$\forall x[[P(x,w_{\cdot})] \rightarrow [Q(x,w_{\cdot})]]]$

Though appealing, this account raises some concerns with respect to the treatment of modified subject NPs. For interpreting (27) in Greenberg’s framework, one has two options.

(26) Des leaders violents sont dangereux
'Des' (plural indefinite) violent leaders are dangerous

The first one is to assume, along the lines of what Greenberg suggests for a similar case, that *violent leader* is associated with a related property, which causes *danger*.

(27) a. Des leaders violents sont dangereux (in virtue of some associated property)
b. $\forall w_{\cdot}[\forall x[[\text{violent leaders}(x,w_{\cdot})] \rightarrow [\text{some associated property } (x,w_{\cdot})]] \rightarrow \forall x,s[[\text{leader}(x,w_{\cdot})] \rightarrow [\text{dangerous}(s, x,w_{\cdot})]]]$

However, what the sentence expresses is that leaders are dangerous in virtue of being violent (Rooth, 1995; Vogeleer and Tasmoski, 2005). Casting this interpretation in Greenberg's framework leads to conclude that leaders are violent by nature.

(28) a. Des leaders sont dangereux (in virtue of being violent)
b. $\forall w_{\cdot}[\forall x[[\text{leaders}(x,w_{\cdot})] \rightarrow [\text{violent } (x,w_{\cdot})]] \rightarrow \forall x[[\text{leader}(x,w_{\cdot})] \rightarrow [\text{dangerous}(s, x,w_{\cdot})]]]$

This shortcoming seems sufficient to reconsider the account, while keeping its motivation: IS sentences rely on a particular kind of accessibility relation (or restriction of the modal basis).

4 Point of views

In what follows we argue that point of views can be treated as restrictions of the modal basis and that different lexical, syntactic and discursive phenomena set point of views.

4.1 Point of views as modal basis restrictors

Point of views are known in the literature under the terms of *frame* (Nunberg, 1975); or *media* (Ross, 1997). These are considered to be sets of content-coherent propositions. In this paper we adopt a broader notion that includes not only spaces, but also *perspectives* that the speaker adopts to draw certain conclusions. A proposition is true or relevant in virtue of being considered under a particular perspective, but false under a different one. Charolles (1997) has shown in detail that there are two different kinds of respects: spatiotemporal (23a) and epistemic (23b). These correspond to easily recognizable expressions in natural language, which, preferably occupy the left periphery.

(29) a. In Europe, people eat five servings of fruits per day
b. According to the doctor, you have to stay home

In formal terms, the modal Kratzerian framework indirectly introduces viewpoints as conversational backgrounds. Kratzer (1981) proposes that modal doxastic and deontic

utterances exploit modal bases, i.e. set of worlds and an ordering relation. *w'*$\leqslant$*w* means that *w'* is preferred over *w* along the dimension with respect to which the worlds in the modal basis W have been chosen. In the same line of thought, in our account, viewpoints determine the modal basis. Worlds that are selected under a certain viewpoint support the same information i.e. are worlds in which the same laws hold. In other words, worlds that belong to the same modal basis are characterized by a set of coherent propositions. Let us call a pair m_1 =(W, $\leqslant$) a modal viewpoint.

(30) $p \rightarrow q$ is true in m_1 iff for every w where p is true, there is a world w' such that
(i) w'$\leqslant$w,
(ii) $p \wedge q$ is true at w' and for every world w'' such that w'' $\leqslant$ w', $p \rightarrow q$ is true at w''.

The intuition behind (30) is that if p is true somewhere in W, there must be a world at least as normal as the world where p is true and $p \rightarrow q$ is true there and down through the world sequence. In other words, from w one can always reach the point where $p \rightarrow q$ becomes irreversibly more normal then $p \wedge \neg q$. (see definition 6, Kratzer, 1991).

The formalization of point of views requires further elaboration, though. Ross (1997) clearly presents the reasons for adding a judge parameter to the world parameter. Assume two superposed circles (Figure 1): a white and a black one, in a world w. The truth of the proposition "the black circle is on top of the white one" depends on the judge: it is true for judge i_2, and false for judge i_1. Under this account, a point of view is determined by a world-judge pair.

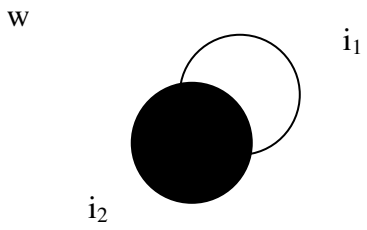

Figure 1 (Ross, 1997)

(31) amends (30). Let us then call a pair m = < <W,I> , $\leqslant$ > a modal viewpoint.

(31) $p \rightarrow q$ is true in m iff for every <w,i> where p is true, there is a world <w',i> such that (i) <w',i> $\leqslant$ <w,i>, (ii) $p \wedge q$ is true at <w',i> and for every world <w'',i> such that <w'',i> $\leqslant$ <w,i>', $p \rightarrow q$ is true at w''.

(31) expresses the fact that a proposition $p \rightarrow q$ becomes irreversibly more normal then $p \wedge \neg q$ in worlds accessible from w in which the perspective of judge i is adopted.

Assuming that point of views are world-judge pairs, the interpretation of generic indefinites is as follows:

(32) IS sentences are true at w iff:
$\forall$<w',i>[[<w',i> $\leq$ <w,i>] $\rightarrow$ $\forall$x[P(x,<w',i>) $\rightarrow$ Q(x,<w',i>)]]
Paraphrase: in all maximally similar accessible worlds, under the point of view of judge i, the proposition $\forall$x[P(x) $\rightarrow$ Q(x)] is true.

In the next session we show that the phenomena presented in section 3 are evidential strategies that instantiate point of views in the sense of (32)[5].

4.2 Some evidential strategies in French

According to our definition of point of view, the truth of the generic sentences holds in all worlds accessible from the actual one, in which the point of view of the speaker holds. Before presenting out account of the data, we make explicit a constraint that is associated with point of views.

(33) **Contrastiveness constraint associated with points of views**. The proposition *p* expressed by assertion *a* must be overtly marked as true *only* relatively to a specified judge.

Default parameters are not sufficient for satisfying the constraint, which is naturally met whenever two contrasting views are involved.

Contrastive topic containing a focused phrase is standardly taken to introduce the presupposition that the focus value is part of a set of alternatives (Rooth, 1985; Büring, 2003). Building on Büring's (2003) view that contrastive topics are bound to discursive contexts in which different sequences are put in place (questions-subquestions or, question-answers pairs), we reinterpret alternatives in a dialogic framework in which every alternative is associated with a different index for the **A**(SSERT) (Jacobs, 1984) operator, i.e. to different participants/different moves of the same participant.

(34) [Un CHIen$_F$]$_{CT}$ [est INTelligent$_F$] $_{COMM}$
= {As, x, P | As $\in$ {speaker, hearer, other participants} | {x $\in$ {chien, chat, …} | P $\in$ {intelligent, stupid, ….}}
= {{{speaker, dog, intelligent; speaker, dog, stupid}, {speaker, cat, intelligent; speaker, cat, stupid}}, {{hearer, dog, intelligent; hearer, dog, stupid}, … }}

It is then clear how the contrastiveness constraint get satisfied: the proposition *a dog is intelligent* is bound to a participant, in contrast with other propositions, bound to different participants. The legitimate interpretation for (34) is (35), which expresses that

[5]See also Matthewson, David & Rullman (2007) and their treatment of evidentials in St'at'imcets.

the causal relation between *dogness* and *intelligence* holds according to judge i, in contrast to at least a different judge.

(35) $\forall$< w',i>[[w' maximally similar accessible from w & i is the speaker] $\rightarrow$ $\forall$x[dog(x,<w',i>) $\rightarrow$ intelligent(x,<w',i>)]]
Paraphrase: in all maximally similar accessible worlds, under the point of view of the speaker, a dog is intelligent

Other contrast strategies. Another contrast strategy consists in comparing two indefinite generic sentences, in which the association with focus operator is itself focused. This way, a framework is set in which (i) every sentence brings its own silent A operator; (ii) the overt association with focus operator, being focused itself, gets bound by the A operator.

We then obtain a scenario in which the speaker asserts one among different propositions (which as before could have been endorsed by other participants). For signaling that in the subsequent sentences the speaker is endorsing one among the other possibilities, we change the index of the second A operator. The contrastiveness constraint is again satisfied[6]. (We spouse the view according to which negation works in association with focus).

(36) $ASSERT_1$[Un $CHIen_{F1}]_{CT}$ [est $INTelligent_{F1}]_{COMM}$, $ASSERT_2$[un $CHAT_{F2}]_{CT}$ $[NON_{F2}]_{COMM}$ / *A dog is intelligent, a cat is not*
= {As, op, x, P | As $\in$ {speaker, hearer, ….} | op $\in$ {no, too} | {x $\in$ {dog, cat…} | P $\in$ {intelligent, stupid, ….}}
= {{{speaker, no dog intelligent; speaker, no, cat, intelligent},{speaker, yes, dog intelligent; speaker yes cat intelligent}}, {{hearer, no, dog, intelligent}, {hearer, no, cat, intelligent}, {hearer, yes, dog, intelligent; hearer yes, cat, intelligent}}}

Evidentials proper. Besides providing information about the degree of confidence of the source of the belief/thinking … the predicates *croire*, *trouver* and *savoir* have the primarily function of overtly specifying the source of the evidence. This is not enough for satisfying the contrastiveness constraint. Besides *trouver* which is specialized for expressing irreducibly attitude holder oriented beliefs, *savoir* and *croire* require extra material for fulfilling the contrastiveness constraint, respectively focus (enhancing the interpretations mentioned in section 2 (see Simons, 2007)) and approval request. In these cases, the following interpretation is legitimated[7].

[6]This trick allows us to render justice of the dialogic dimension when one participant is involved.
[7]The contrastiveness constraint is also naturally fulfilled by focused adverbs expressing probability expectations of the speaker. The same reasoning as above applies

(37) $\forall$<w',i> [[w' maximally similar accessible from w & i is the speaker] $\rightarrow$
$\forall$x[dog(x,<w',i>) $\rightarrow$ intelligent(x,<w',i>)]]
Paraphrase: in all maximally similar accessible worlds, under the point of view of the speaker, a dog is intelligent

Modalities. The treatment we have proposed here for indefinite generics shares the basics insights of Stephenson (2006) after McFarlane (2006): epistemic modals introduce a parameter for the holder of the belief. Crucially, again, either the modal has to be stressed, or the sentence has to be used in polyphonic contexts, in which the belief is questioned. Bringing in other epistemic evaluations bound to other participants, the contrastiveness constraint is satisfied.

(38) [Une fille]$_{TOPIC}$ [[peut$_F$] aller à l'école]$_{COMM}$
$\exists$<w',i> [[w' maximally similar accessible from w & i is the speaker] $\rightarrow$
$\forall$x[girl(x,<w',i>) $\rightarrow$ go_to_school(x,<w',i>)]]

We suggest treating indefinite generics with deontic modals in a similar way. It is the case that this kind of sentences (expressing *p*) are uttered in contexts where it is *not* necessarily put into practiced that *p* or in exception configurations. By uttering (15), the relevant participant endorses the law, and the sentence obtains its *prescriptive* character.

5 Conclusion

The account we have proposed for generic indefinites pleads in favor of a unitary view of indefinites as requiring an anchoring context in any of its uses, existential and predicative indefinites (Mari and Martin, 2008b). We have introduced the notion of point of view, which, after Ross (1997) and Stephenson (2006) we have instantiated as world–judge pairs. Point of views come along with a contrastiveness constraints, requiring the truth of the proposition expressed by the indefinite generic sentence to be overtly signaled as relative to a judge, in contrast with at least a different judge. For a general theory of indefinite generic, this entails that they express a truth which is not based on induction, but depends on a different parameter, namely the judge. For a general theory of subjective meaning, this sheds new light on contrast and focus as bounded to a dialogic dimension, in which alternatives get bounded to different participants in the conversation. This treatment of focus provides a theoretical framework for the notion of prescription. Finally, attitude verbs are also shown to improve the acceptability of indefinite generic sentences since, in their evidential use, they (i) introduce a judge parameter, (ii) are lexically, prosodically, and discursively bounded to strategies that satisfy the contrastiveness constraint.

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Particles, Modality and Coherence*

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Abstract

This paper considers some aspects of the meaning of sentence-final particles. Such particles have a use on which they serve to emphasize what is said, and a use on which they have a modal semantics. The present paper is an attempt to unify these two uses from the perspective of discourse coherence. The conclusion is that sentence-final particles are used to maintain coherence.

This paper is about sentence-final particles, such as *man* in English and *yo* in Japanese.

(1) It's raining, man.

(2) ame-ga futteiru yo
rain-Nom falling YO

'It's raining, man.' (Japanese)

These particles have a number of interesting properties. The paper begins with an exploration of some of the things SF particles can do. We will see that they can be used to emphasize the content in their scope, and also have a modal interpretation in certain contexts. We then turn to an examination of previous analyses of these properties. I then present a new (meta)theory of sentence-final particles that unifies their emphatic and modal qualities under the rubric of discourse coherence. The paper closes with a discussion of the relation between particles and modality from the perspective of coherence.

Before going on, let me note that the English particles also have a sentence-initial use. When used sentence-initially, *man* has a kind of emotive meaning, and also can function as a degree modifier.

(3) Man, it's hot.

On this use, the particles exhibit interesting locality constraints and interactions with definiteness. However, the Japanese particles can only be used sentence-finally. I want

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to exclude the sentence-initial use in this talk; they need a very different kind of semantic analysis.

1 Data on Sentence-Final Particles

What is the basic function of the sentence-final particles? Intuitively, it is to provide emphasis. In (4), adding *yo* seems to provides emphasis, or adds a sense of urgency to the utterance.

(4) Taroo-ga kita (yo)
Taro-NOM came (YO)

'Taro came (, man).'

The basic semantics of SF particles seems to be the same cross-linguistically, though there are differences. I will draw on English and Japanese for the basic examples, showing differences when needed.

The particle produces a sense of insistence in imperatives as well. The particle-less version below is simply a request for the hearer to go to Disneyland. The version with the particle, however, gives the impression that the speaker is trying to convince the hearer that the going is something that should happen.

(5) Dizuniirando ni it-te (yo)
Disneyland to go-Imp (YO)

'(Come on,) Go to Disneyland.'

(6) Go to Disneyland, man.

The basic function of the particle is to strengthen what is said—-'I insist you accept what I have said'. It's easy to see this in dialogues where dubiety about φ in the particle's scope has been expressed. It is rather more natural to use particles than not in situations like these, if the speaker is actually trying to convince the hearer of the truth of φ. If the speaker doesn't really care, of course, the particle isn't necessary. Such cases will generally be associated with a characteristic, 'flat' intonational pattern.

Consider this dialogue. Here *yo* is natural in A's second utterance in the following dialogue, where A is explicitly denying B's denial of A's first utterance.

(7) a. A: saki Jon-ga kaetta
just.now John-NOM went.home

'John just went home.'

b. B: uso!
lie

'No way!'

c. A: kaetta #(yo)
went.home (YO)

'He DID go home!'

English is the same when intonation is kept flat and inexpressive.

(8) a. A: John is coming tonight.

b. B: No way.

c. A: # He's coming.

d. A: He's coming, man.

Adding intonational prominence in the repetition makes the dialogue felicitous, of course (He's COMING!). This indicates, again, that use of *man* is similar to emphasis.

Indeed, something similar also happens in questions. Adding the particle to a question also induces a sense of emphasis, or coercion.

(9) a. Is it raining?

b. Is it raining, man?

Here, though, there is a difference: the speaker is insisting on an answer, not on the question (whatever that would mean). The situation with the three clause types can be summarized in the following table.

Clause type	Effect
Declφ+SFP	Acceptφ
Impφ+SFP	Accept obligation to do φ
Qφ+SFP	Accept obligation to answer ?φ

This is not the only thing the particles can do, though. They can also work—in some ways—like modals in certain circumstances. The particular circumstances involve modal subordination. The term 'modal subordination' is applied to situations where a modal 'accesses' content in the scope of another modal. Ordinarily this is tested via anaphora. As is well known (e.g. Kamp and Reyle 8), modals, like negation and other operators, normally block anaphora when the indefinite antecedent is read *de dicto*:

(10) A wolf might come in. # It is very big.

If the second sentence also contains a modal, however, anaphora is felicitous.

(11) A wolf might come in. It would/might eat you first.

Here the intuition is that the second modal is able to 'pick up' the content of the first. If the first sentence is true at a world, that world will contain an object in the extension of *wolf*. This object can then serve as antecedent to *it* in the second sentence. This is the basic intuition, which has been spelled out in varying ways by many people (17; 6; 20; 2).

Not every modal(like object) licenses modal subordination, however. It is well known that futurates like *will* fail to do so.

(12) A wolf might come in. # It'll be very big.

(13) A wolf might come in. # It'll eat you first.

These discourses are bad for most people; intuitively *will* is too tied to the actual world for them to 'go into' the scope of the first modal. Very surprisingly, though, adding a particle makes modal subordination with *will* perfect.[1]

(14) A wolf might come in. It'll be very big, man.

(15) A wolf might come in. It'll eat you first, man.

The case of Japanese is roughly similar. In this language, modal subordination is basically impossible without an overt modal (McCready and Asher 14). But, somewhat bizarrely, the addition of *yo* makes modal subordination fine, even when no modal is present.

(16) # ookami-ga kuru kamosirenai. ∅ anata-o taberu
wolf-NOM come might $\varnothing_{pro}$ you-ACC eat

'A wolf$_i$ might come in. It$_i$ (will) eat you.'

(17) ookami-ga kuru kamosirenai. ∅ anata-o taberu yo.
wolf-NOM come might $\varnothing_{pro}$ you-ACC eat YO

'A wolf$_i$ might come in. It$_i$ (will) eat you, man.'

The reason most likely lies in the Japanese tense system. Japanese has only a past and a nonpast tense (16), which means that the nonpast tense also plays the role of enabling talk about the future. In this sense, it also has a modal interpretation.

There are many similar particles in various languages. English has the particles *dude, boy, girl*, and a number of others. Spanish makes use of *tío* (in Castilian Spanish), and *guey* in Mexican Spanish.[2] At least one variety of German has a similar particle *Mann*, which, interestingly enough, means the same as English *man*. The variety in question is Kanak Sprak, a kind of youth language used among some groups of German speakers.[3]

(18) a. Könnt jetzt voll der Löwe reinkommen
could now full the lion enter-the-room

'A lion could totally come in.'

b. Ey, der beisst Dich, Mann
he bites you man

'Hey, he (would) bites you, man.' (due to Stefan Hinterwimmer)

[1]Note: I used the contracted *it'll* because it sounds more natural with the particle, as the particle is associated with casual speech.

[2]I have not tested the behavior of the Spanish particles in modal subordination contexts.

[3]Some speakers also apparently refer to it as *Kiez Sprache* 'hood language.' It relates to other languages spoken by multi-ethnic groups of young speakers in Europe like *straattaal* in the Netherlands.

Notice that, like Japanese, we don't even need a modal in the second sentence for this to work. Here, though, the explanation I gave above about tense systems does not directly apply, which makes the phenomenon more mysterious. I have no explanation for this fact at the present moment.

At first glance the modal use and the emphatic use seem completely unrelated to each other. What, after all, does emphasis have to do with modality? The central puzzle this talk aims to address is thus: what is the relationship between the 'emphatic' use and the 'modal' use of the particles? Further, given an answer to this question, how should this relationship be formally spelled out? I will take the following route toward an answer to these questions. I first examine the only existing prior account of the facts and try to determine what we can learn from it about the general function of particles. This will lead us to a picture of particle meaning that takes coherence, and in particular discourse coherence, into account. This in turn will suggest an intuitive way to formalize things.

2 Previous Accounts

As far as I know only one formal account of these particles is available (12; 13). There are two parts to this story, corresponding to the emphatic and modal uses. I will explore each in turn.

First the emphatic use. For this we need dynamic semantics. The use of dynamic logic in this formalism makes processing a formula directly effect a change in the model, which can be understood as the processor's information state. This produces a direct connection between processing and information content, and—crucially—a straightforward way to talk about non-truth-conditional content, because we can treat objects whose role is to tell us how to process certain bits of information.

What happens when an interpreter processes a sentence? According to dynamic theories, she adds the information contained in that sentence to her information state. What happens then? If the information in the sentence is compatible with the information the interpreter already has, the new information is simply added to the information state by a process of *update*. However, if the information already in σ is incompatible with the new information ϕ, then the result of update is the empty set, which corresponds in this theory to $\bot$, the absurd state. When an update results in the absurd state, the discourse fails.

Of course, actual interpreters do not enter the absurd state when they learn a piece of information that conflicts with their beliefs. The obvious way to solve the problem is to provide a theory of belief change that allows for retraction of previous beliefs when they conflict with new facts. Gärdenfors (7): defines a 'downdate' operator, the opposite of update. Downdate is an operation that removes content from an information state rather than adding it; I will write 'downdate with φ' as '$\downarrow \varphi$'. Downdating an information state I with φ (equivalently: updating I with $\downarrow \varphi$) yields $I - \varphi$. The analysis of the particles will make crucial use of this operation.

I use downdate to define the following operation, which I call 'strong assertion.' Here, as usual in dynamic semantics, ';' denotes dynamic conjunction (function composition).

(19) $\sigma[sassert\varphi]\sigma' =$
$\sigma[\varphi]\sigma'$ if $\sigma[\varphi] \neq \varnothing$
$\sigma[\downarrow \neg\varphi; \varphi]\sigma'$ else.

That is, update with φ if such an update is admissible (does not result in an empty—crashed—information state)–and, if not, first downdate with the negation of φ and then re-update with φ. Thus $sassert(\varphi)$ makes update with φ always possible, regardless of whether φ conflicts with the original information state.

My suggestion now is that the strength associated with sentence-final *man* comes directly from its denotation: it simply indicates strong assertion. Its lexical entry therefore is simple.

(20) $[\![man_{sf}]\!] = \lambda p.sassert(p)$

It will be clear how this accounts for the feeling of strength imparted by the particle: if the hearer assents to the update, the downdate associated with *sassert* will steamroll any objections the hearer might have had to assenting to whatever is in its scope. Further, it makes perfect sense now why it is natural to use *man* in contradicting explicit denials: here, it has already been signaled that ordinary update will fail, so use of the particle is in fact *necessary* if the speaker wants to get her point across.

This is the basic strategy. Two potential problems should be noted here. First, obviously this predicate does not directly cover the imperative and question cases, but the extension to them is obvious; we merely need a dynamic logic with some provision for actions, e.g. that of Mastop (10). This is not the place to present such an extension.

A second issue can be raised by a possible objection: but this is just assertion!! This is certainly true. Assertions are intended to cause the interpreter to accept their content. But note that something additional is going on. The particle explicitly strengthens the assertion via the downdate operator and thereby signals *explicitly* the importance the speaker assigns to the proposition. It is this explicitness that makes the particle special.

Japanese *yo* is slightly different in that it is generally agreed to be restricted to content that is hearer-new (in some sense), e.g. Takubo and Kinsui (18); Noda (15). We thus can add a presupposition to this effect. McCready (13) argues that this is best expressed in utility-theoretic terms. Doing so lets us make the connection to imperatives very direct (in principle). On this picture *yo* is going to have a presuppositional and an asserted component, as follows:

(21) $[\![yo(\varphi)]\!] =$

a. Presupposition: $\mathcal{B}_S IV_H(Q, \varphi) > d_s$

b. Semantics: $\sigma||sassert(\varphi)||\sigma'$

So the informativity value of φ is presupposed to be above a contextually set relevance threshold (cf. Kennedy 9), and φ is 'strong-asserted.' This is pretty satisfying, and

serves to explain the facts above. But what about the modal use? Plainly the analysis above has nothing to say about it.

McCready (11, 12) give the following analysis. Sentence-final particles are underspecified and interpreted as modal in certain circumstances. These circumstances are just those which involve weak causation between an event in the scope of a modal and another event in the scope of the particle. This idea is spelled out within Segmented Discourse Representation Theory/SDRT (1), a theory of discourse structure which uses a nonmonotonic logic to compute binary relations between discourse segments. What relation holds for two given segments is calculated using information from context, world knowledge, and the content of the segments themselves. What relation is inferred in the logic depends on the specificity of antecedents: the more specific antecedent wins, so the least general discourse relation is preferred. The resulting structure has the form of an acyclic graph: nodes are discourse segments, edges are discourse relations This structure puts constraints on anaphora and is interpreted dynamically.

The analysis of sentence-final particles in this system comes in two parts. First a a special discourse relation *Dep*, is defined to hold in the modal subordination contexts described above.

- $\langle \alpha, \beta, \gamma \rangle \wedge Epist\_mod(\alpha) \wedge occasion(\alpha, \beta) > Dep(\alpha, \beta)$

So *Dep* holds just of two segments where the first is modified by an epistemic modal and its content occasions the second, where

$$occasion(p, q) \leftrightarrow ((p \rightarrow \Diamond q) \wedge (\neg p \rightarrow \neg \Diamond q)).$$

Second, the meaning of the sentence-final particle is left underspecified in such a way that its resolution is dependent on what relation is inferred.

(22) a. $\exists \pi \exists \pi' \exists R[man_?(\varphi, l) \wedge R(l, \pi) \wedge Dep(\pi', \pi) > man_\Diamond(\varphi, l)$

b. $\exists \pi \exists R[man_?(\varphi, 1) \wedge R(l, \pi) > man_{sassert}(\varphi, l)$

Now the particle itself has the following semantics.

(23) Semantics for *man* (underspecified version):

a. $\sigma \| man_{sassert}(\varphi) \| \sigma'$ iff $\sigma \| sassert(\varphi) \| \sigma'$

b. $\sigma \| man_\Diamond(\varphi) \| \sigma'$ iff $\sigma \| might(\varphi) \| \sigma'$

This semantics has the desired effect: the sentence-final particle will be interpreted as modal in modal subordination-type contexts, and as strong assertion elsewhere. Another rule is actually needed for cases where both a modal and a particle modifies the second sentence (12). I will not discuss this here. Japanese *yo* is of course identical barring the presupposition about new information.

This story looks at least descriptively adequate, though two simple problems need to be fixed. First, the particle is analyzed with a $\Diamond$ meaning. This is wrong—-we need a universal modal. Second, on this analysis, there is no insistent quality associated with

the modal meaning. Intuitively, though, there is such a quality. So this needs to be added. A revised semantics can be given as follows.

(24) a. $\sigma \| man_{sassert}(\varphi) \| \sigma'$ iff $\sigma \| sassert(\varphi) \| \sigma'$

b. $\sigma \| man_{\Box}(\varphi) \| \sigma'$ iff $\sigma \| sassert(\Box(\varphi)) \| \sigma'$

This analysis seems to get things more or less right. But it has nothing to say about *why* this state of affairs should hold. The plan now is to determine what the commonalities are between the two meanings of the particles, and give a more explanatory analysis.

3 Unifying the Two Uses

The basic idea I will work with is that *the particle works to maintain coherence.*

A preliminary question before proceeding to the particles: How can a discourse (update) go wrong and become incoherent? It seems that there are (at least) two ways.

1. One can try to update with a sentence φ which is inconsistent with the rest of the discourse. On a dynamic picture:

$$\sigma[\varphi] = \emptyset$$

2. One can try to update with a sentence with unsatisfied presuppositions. Again (assuming e.g. Beaver's (2002) 'test-to-update' picture of presupposition):

$$\sigma[\varphi] = \emptyset$$

The speaker is thus faced with a dilemma. What can she do if she wants to communicate φ but knows that either the hearer believes $\neg\varphi$ (case 1) or the presuppositions of φ won't be satisfied (case 2)?

One answer, in light of the preceding discussion, is clear: make use of sentence-final particles. If accepted, this will force revision of the hearer's belief state in case 1, resulting in coherent update. It can also fix one particular kind of presupposition failure: that when a pronoun is unbound due to accessibility issues involving modals. Thus we can think of the particles as operators that work to ensure that coherent update is possible, within certain constraints.

The analysis of the modal meaning of *yo* should be revised to reflect this new picture.

SDRT has a concept of *maximizing discourse coherence* (Asher and Lascarides 2003: 230-238). A discourse structure (and hence a resolution of underspecified conditions is optimal ($\leq_{\alpha,\beta}$-maximal) iff it contains the minimal number of labels (i.e. has a simpler structure), has the fewest number of clashes (contradictions, semantic or pragmatic), makes use of the strongest discourse relations, and contains the smallest number of underspecifications, so that all underspecified objects are resolved to one of their possible meanings. For us here, the last two conditions are relevant. Note that the last condition

means that as many anaphoric elements as possible are resolved. This total includes presuppositions (19).[4]

Let us now consider how things will play out in the case of the particles. There are two cases.

The first involves modal subordination contexts. Note first that structures with *Dep* inferred are preferred to non-*Dep* structures (because *Dep* is stronger than other default relations that might be inferred here like *Continuation*) Also, structures in which the particle is interpreted as modal are preferred, because (since anaphors can be resolved to binders in the scope of the modal in S1) more underspecifications will be resolved in them. Thus $particle_{\Box}$ interpretations are preferred in such contexts. We get the desired result that particles are interpreted as modal in modal subordination contexts.

The second case involves contexts where there is no modal subordination. Here the situation will be different. There is no need to infer *Dep*; other relations will hold between the discourse segments. This fact, however, seems less important than that intepreting the particle as modal won't help bind any variables, because there is no modal subordination. This just means that either interpretation is possible for the particle. Why then does the modal interpretation not arise in these contexts?

I think there is a natural way to explain these facts. First, note that modal statements are weaker than nonmodal ones.[5] The third rule of MDC says to prefer stronger discourse relations. This notion can be generalized to specify that stronger interpretations should be preferred in general: 'Prefer logically stronger structures when possible.' This seems like an obvious pragmatic constraint. Modifying the definition of MDC in this way will cause the desired result to follow.[6]

The upshot is that the modal meaning for SF particles is preferred *for reasons of discourse coherence*, not because of ad hoc rules. Further, this preference follows from existing constraints on discourse interpretation coupled with easily justifiable pragmatic considerations. We now have a clear picture of the relation between the emphatic and modal uses of the particles: both work to maximize the coherence of a discourse. Let me briefly address some possible worries about the analysis.

Worry 1: Don't you predict that using a particle would always be a way to save an otherwise bad discourse? For example, take an example with an unsatisfiable presupposition.

(25) You brought your pink elephant today, man. (out of the blue)

Here wouldn't we select some kind of update in which the presupposition introduced here is made coherent? Response: This worry is misplaced. There is no way to update a discourse with no antecedent for the presupposition in such a way for it to be bound. The MDC only allows us to compute across available structures, and no structure is made

[4]Notice that this kind of definition involves an OT-like comparison of different possible structures.

[5]Or so the standard wisdom goes.

[6]The proposed modification of MDC suggests treating the whole matter of particle interpretation and coherence in terms of utility and relevance maximization (cf. papers in Benz et al. 4. This is left for later work.

available in which the presupposition is satisfied, given the lexical resources available to the sentence. .

Worry 2: How about this one then? Why can't we force downdate with $\phi \wedge \neg\phi$ to make a coherent update?

(26) It's raining and it's not raining, man.

Response: Because no matter what downdates we do updating with $\bot$ yields $\emptyset$, which signifies a failed discourse move in dynamic semantics. Notice, also, that other examples like the modal subordination ones will fail, e.g.

(27) Every degree candidate stepped to the stage. # He had a degree in astrophysics.

The reason is that the particles only have the lexical resources to go modal, which won't help in cases of quantificational subordination.

To summarize this section, we have now found a relation between the two uses of sentence-final particles. Both work to maximize the coherence of particular discourse moves, either by forcing coherence (= nonfailure) of an update or enabling the satisfaction of anaphoric presuppositions in cases of modal subordination These uses were analyzed making use of techniques from dynamic semantics and SDRT.

4 Discussion: Particles and Modality

I want to close the talk by considering the relationship between particles and modality, which will bring us to a second kind of understanding of how the two uses are related.

What do modals do? Consider an account of modality like that of Veltman (21). The story goes like this.

- Assume σ (= an information state) a set of worlds, φ a set of worlds. Then:
- $\sigma[\varphi] = \sigma \cap \varphi$
- $\sigma[\Diamond\varphi] = \sigma$ if $\sigma \cap \varphi \neq \emptyset, \emptyset$ otherwise

So $\Diamond$ is effectively a consistency check on σ wrt φ.

Another standard account, that of standard Kripke semantics for modal logic (see e.g. Blackburn et al. 5).

- $\Diamond\varphi = 1$ iff $\exists w'[wRw' \rightarrow \varphi(w') = 1]$

This also basically indicates a consistency check. We can take epistemic modals to essentially check whether the proposition in their scope is consistent with the rest of the speaker's knowledge.

How does this relate to particles? Note that particles have two interpretations, a modal one on which they basically perform a consistency check (is φ possible?) and an emphatic

one, on which they function as consistency enforcers (make φ possible!). Both interpretations make reference to consistency. This is another way to think of the relationship between the two uses. Ultimately, the moral emerges: *Sentence-final particles are objects that semantically manipulate global properties of information states: for the ones discussed, consistency and coherence.* It remains to be seen whether this generalization holds across the board.

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Pluractionality in Karitiana*

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Abstract

This paper focuses on the expression of number in Karitiana. It claims that both its noun and its verb have cumulative denotations, and argues that pluractional affixes perform a plural operation on verb denotations that subtracts its singular events. The paper provides evidence for a difference between lexical and phrasal cumulativity as proposed in Kratzer 2001, 2005.

1 Introduction

Karitiana is the sole surviving language of the Arikén family, Tupi stock. It is spoken by about 350 people that live in a reservation located to the south of Porto Velho in the northwest of Brazil in the state of Rondônia (cf. Storto & Velden 2005).

Karitiana is a verb final language. There is a complementary distribution between embedded and matrix clauses with respect to the position of the verb. Matrix clauses are (mostly) verb-second, whereas embedded clauses are always verb-final. Storto 1999, 2003 assumes that movement of the verb in matrix clauses is related to the presence of agreement and tense, which are totally absent in dependent clauses. In spite of the fact that noun phrases are not marked for case in Karitiana, its Case pattern is ergative-absolutive, in that intransitive verbs agree with their subjects, and transitive verbs agree with their direct objects. This pattern is characteristic of Tupi languages in general.

The language has a process of reduplication that operates on verbs, which apparently encodes a number of meanings, such as multiplicity of participants and/or of events. We will claim that reduplication affixes are pluractional markers (cf. Sanchez-Mendes

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2006). According to Lasersohn 1995, these markers are verbal affixes that indicate the occurrence of a multiplicity of events.

Noun phrases, on the other hand, are not marked for number in the language. They are totally devoid of functional material, such as articles, quantifiers, classifiers, or morphological markers of number or gender (cf. Müller *et al.* 2006).

This paper focuses on the expression of number in Karitiana. Our goal is to explain the semantics of pluractional markers in the language.

2 Background

The account will be laid out within an event semantics - VPs are assumed to have an event argument (cf. Davidson 1967, Parsons 1990, Schein 1993, Lasersohn 1995, among others). More specifically, we will assume the framework of Kratzer 2001. In this framework, subjects are not considered arguments of the verb, whereas objects are. Verb phrase denotations are taken to be minimal in that they denote an event in which nothing apart from what is encompassed by the lexical meaning of the verb happens.

We will also assume the Cumulativity Universal, which claims that the denotations of simple predicates in natural languages are cumulative (cf. Krifka 1992, Landmann 1996, Kratzer 2001, 2005). A predicate is cumulative if whenever it applies to two individuals in its denotation, it also applies to their sum. A classical example is plurals. If Mary and John are students and Carlos and Andrea are students, then Mary and John and Carlos and Andrea are students. That is, any sum of students also belongs in the denotation of *students*. The formal definition of cumulativity for nouns is presented in (1) and illustrated in (2) for the noun stem √*student*. The definition of cumulativity for verbal predicates is presented in (3) and illustrated in (4) for the verb stem √*fall* (cf. Kratzer 2001). Note that Kratzer assumes a neo-davidsonian semantics for verbs, in that the external argument is not an argument of the verb. In the case of (4), √*fall* is analyzed as an ergative verb.

(1) Cumulativity (properties of individuals):
$\lambda P_{<et>} \forall x \forall y [[P(x) \& P(y)] \rightarrow P(x+y)]]$

(2) $[\![\surd\text{student'}]\!] = \{\text{Mary, John,…, Mary+John,…, Mary+John+Carlos+Andrea}\}$

(3) Cumulativity (properties of events):
$\lambda P_{<st>} \forall e \forall e' [[P(e) \& P(e')] \rightarrow P(e+e')]]$

(4) $[\![\surd\text{fall'}]\!] = \{<\text{Mary, fall}_1>, <\text{John, fall}_2>, \ldots, <\text{Mary+John, fall}_1 + \text{fall}_2>, \ldots\}$

A consequence of the Cumulativity Universal is that lexical cumulativity should be available in all natural languages at no cost. It should not depend on the particular make-up of its Noun Phrases (NPs) or Verb Phrases (VPs) (cf. Kratzer 2005). Theoretically, the composition of an ergative verbal stem like √*fall* and a nominal stem like √*student*, should result in an array of possible interpretations due to the cumulative denotations of its constituents. The possible readings are listed in (5).

(5) [[fall']] ([[student']]) is true for:
- "collective" falls: a group of students falling at the same time;
- cumulative falls: some falling first, then others,…;
- iterative falls: the same student(s) falling for a number of times.

The next two sections show that the null hypothesis to assume for Karitiana nouns and verbs is that their denotations are cumulative.

3 Noun Phrases in Karitiana

Noun phrases are not marked for number in Karitiana. There is no morphosyntactic marker for number within the noun phrase. In sentence (6) below, the phrase *myhint pikom* ('one monkey') is semantically singular, whereas in sentence (7) the phrase *sypomp pikom* ('two monkeys') is semantically plural. However, both NPs remain uninflected for number in the two contexts. These two sentences also show that Karitiana makes no use of numeral classifiers. Third person pronouns are also neutral as far as number is concerned. The subject of sentence (8) may refer to both singular and plural entities.

(6)
Yn	naka'yt	myhint	pikom[2]
yn	naka-'y-t	myhin-t	pikom
1S	DECL-eat-NFUT	one-OBL	monkey

'I ate one monkey'/'I ate monkey once'

(7)
Yn	naka'yt	sypomp	pikom
yn	naka-'y-t	sypom-t	pikom
I	DECL-eat-NFUT	two-OBL	monkey

'I ate two monkeys'/'I ate monkey twice'

[2]Glosses are as follows: 1st line: orthographic transcription, 2nd line: morphological segmentation. Symbols used: NFUT= non future, AUX = auxiliar, PART = participle, REDUPL = reduplication, DECL = declarative, CAUS = causative, NEG = negation, 3 = 3rd person, 1S = 1st person singular possessive, FUT = future, EXIST = existential, 3ANAPH = 3rd person anaphoric prefix, SUB = subordinator, ASSERT = assertative, POS = posposition, PASS = passive, OBL = oblique sufix, VERB = verbalizer.

The translations given are the ones volunteered by the native speaker. Other readings of the same sentence might very well be possible.

(8) I naokoot õwã
i ∅-na-okoot-∅ õwã
he/they 3-DECL-bite-NFUT kid
'He/They bit the/a/some kid(s)'

In Karitiana, noun phrases are bare in that they do not project for determiners or quantifiers or are marked for (in)definiteness. The many possible translations of sentence (9) show that definite and indefinite interpretations – if they exist – do not arise from morphology or lexical meaning. They also show that nouns and Noun Phrases are number neutral in that their interpretations encompass both singularities and pluralities.

(9) Taso naka'yt boroja
taso Ø-naka-'yt boroja
man 3-DECL-eat-NFUT snake
'The/a/some man/men ate the/a/some snake(s)'

Numerals are best analyzed as adjuncts in the language, not as quantifiers, since they are not Determiner-Quantifiers, and may take scope over NPs and VPs as illustrated by sentences (6) and (7) above.[3] Sentence (10) shows that numerals are not tied to the NP constituent.

(10) Sypomp nakaponpon João sojxaty kyn
sypom-t ∅-naka-pon-pon-∅ João sojxaty kyn
two- OBL 3-DECL-shot-REDUPL-NFUT João boar POS
'João shot twice at the/a/some boar(s)'/'João shot at two boars'

Universal quantification and demonstrative functions are not expressed by determiners but by subordinate clauses as shown in sentences (11) and (12). In sentence (11) the universal interpretation is achieved by a subordinate clause composed by the verb *to be* and a subordinator. And the demonstrative meaning is achieved by a constituent made out of a locative, the noun and the verb *to be*, as can be seen in sentence (12).

(11) Pikom akatyym naponpon João
pikom aka-tyym Ø-na-pon-pon-Ø João
monkey be-SUB 3-DECL-shoot-REDUPL-NFUT João
'João shot at all the monkeys'
Literally: 'João shot at monkeys that be'

[3]See Bach *et al.* for the D(eterminer)- vs. A(dverbial)-Quantifier distinction.

(12) Ony sojxaty aka kyn nakapon João
ony sojxaty aka kyn Ø-naka-pon-Ø João
there boar be POS 3-DECL-shoot- NFUT João
'João shot at that boar'
Literally: 'João shot at boar (that) be there'

Karitiana does not have determiner quantifiers in the same way as English and other Germanic and Romance languages do. Quantifying expressions are adverbials. The informant uses the word *si'irimat* indistinctly to translate either *nobody* or *never*, as in sentences (13) and (14) below. And in sentences (15) and (16), the word *kandat* ('a lot') is used to translate both quantification over entities (10) and quantification over events ('work a lot') (11).

(13) Isemboko padni si'irimat eremby
i-semboko padni si'rimat eremby
3-get.wet NEG ever hammock
'Hammocks never get wet' (≡ No hammocks ever get wet)

(14) Iaokooto padni si'rimat y'it
i-a-okooto padni si'rimat y-'it
3-PASS-bite NEG ever 1S-son
'My son was never bit' (≡ Nobody bit my son)

(15) Kandat nakahori dibm taso
kandat Ø-naka-hot-i dibm taso
a.lot 3-DECL-leave-FUT tomorrow man
'Many men will leave tomorrow' (≈'Men will leave tomorrow many times')

(16) Pyrykiidn taso pytim'adn kandat tyym
pyry-kiit-n taso pytim'adn kandat tyym
ASSERT-EXIST-NFUT man work a.lot SUB
'There are men that work a lot'

Typologically Karitiana is closer to the Chinese-type languages, which are characterized by the free occurrence of bare nouns as arguments and by the absence of number inflection, among other traits (cf. Chierchia 1998). Under Chierchia's proposal, in this type of language, lexical nouns denote kinds. Nevertheless, unlike the Chinese-type languages, Karitiana makes no uses of classifiers.

Based on the Cumulative Universal, the null hypothesis to assume for Karitiana is that its nouns have cumulative denotations. The facts that the language has no number inflexion, no classifiers, nor determiners, and that bare nouns are number-neutral support that hypothesis as far as nouns are concerned. In the next section, we will argue for cumulativity in the verbal domain.

4 Verb Phrases in Karitiana

A prediction of the 'cumulativity from the start' hypothesis is that cumulative interpretations should be available at no cost (Kratzer 2001). We have already seen that this is so for noun phrases. In this section, we will see that this should also be the null hypothesis for verbs in Karitiana. A sentence with bare arguments like (17) is made true by any number of entities of the appropriate kind and by any number of events.

(17) Taso naka'yt boroja
taso ∅-naka-'y-t boroja
man 3-DECL-eat-NFUT snake
'Men ate snakes'
Literally: 'An unspecified number of men ate an unspecified number of snakes an unspecified number of times'

Sentence (18) has all the array of readings predicted by lexical cumulativity: collective action, iterated action and all sorts of cumulative actions. In the readings where the numerals take scope over the arguments, the same two students may have lifted the same two kids collectively, each student may have lifted one of the kids, one student may have lifted the two kids, and the other one only one of them, and so on. The only reading that is not allowed is the one that requires phrasal distributivity, that is, the one where two students lifted two (different) kids each.[4]

(18) Sypomp aluno namangat sypomp õwã
sypom-t aluno ∅-na-mangat-∅ sypom-t õwã
two-OBL student 3-DECL-lift-NFUT two-OBL kid
'Two students lifted two kids (together, or one each, or any of the possible cumulative combinations any number of times)'
*'Two students lifted two kids each'
'Students lifted two kids twice'

We will begin our analysis of pluractionality in Karitiana by assuming that cumulativity is a property of both its nouns and its verbs.

5 Pluractionality in Karitiana

Karitiana makes use of pluractional markers. Pluractional markers in Karitiana are usually expressed by reduplication. The contrast between the verbal predicates in (19) and (20) illustrates the use of reduplication in Karitiana. In (19), the two eggs were broken at the same time, that is, there was only one breaking event, and no reduplication

[4]We have no data on phrasal distributivity over the subject, that is, of the same two kids being lifted by two different students each (i.e. there should be a total of four students in this scene).

occurs. In (20), the pluractional affix - reduplication - is used to express that more than one breaking event has taken place.

(19)

Õwã	nakakot	sypomp	opokakosypi
õwã	Ø-naka-kot-Ø	sypom-t	opokakosypi
kid	3-DECL-break-NFUT	two-OBL	egg

'The kid broke two eggs'
Context: the two eggs at the same time

(20)

Õwã	nakokonat	sypomp	opokakosypi
õwã	Ø-na-kot-kot-a-t	sypom-t	opokakosypi
kid	3-DECL-break-REDUPL-VERB-NFUT	two-OBL	egg

'The kid broke two eggs'
Context: one at a time

According to the literature, pluractional markers are morphemes, usually verbal affixes that express a great variety of notions. They indicate that a multiplicity of events has occurred, which may involve multiple participants, times or places (cf. Cusic 1981, Lasersohn 1995).

> "These morphemes normally take the form of some sort of affix on the verb… , and expressing a broad range of notions typically including action by more than one individual, temporally iterated action, and specially scattered action" (Lasersohn 1995, p. 238).

Lasersohn 1995 defines the semantics of pluractional affixes as in (21). The definition states that, when a verb with pluractional morpheme applies to a plural event, the singular predicate is true of every singular event that is part of that plural event. Pluractional affixes then imply the occurrence of a plurality of events. The cardinality of this plurality, according to Lasersohn, is to be determined by the context and is usually taken to be 'many'.

(21) $\text{V-PA(E)} \leftrightarrow \forall e \in E\ [\text{V}(e)\ \&\ \text{card}\ (E) \geq n]$
where:
V: verb;
PA: pluractional marker;
E: variable over sets of events;
e: variable over atomic events;
n: variable over the natural numbers.

We have claimed in the previous sections that nouns and verbs in Karitiana have cumulative denotations. This implies that cumulative readings should be available with or without the occurrence of pluractional markers. That this is so is shown by the fact

that sentence (22) with no reduplication has the same readings as sentence (23) with reduplication in the context of a plural event.

(22) João naakat ipon pikom kyn
João Ø-na-aka-t i-pon-Ø pikom kyn
João 3-DECL-AUX-NFUT PART-shoot-NFUT monkey POS
'João shot at monkeys'
Context: more than one shooting

(23) Pikom kyn naponpon João
pikom kyn Ø-na-pon-pon-Ø João
monkey POS 3-DECL-shoot-REDUPL-NFUT João
'João shot at monkeys'
Context: more than one shooting

Sentences (24) and (25) with the adverbial *kandat* (a lot/a lot of times) make the same point. Sentence (24) is capable of expressing iteration of an action without the use of a pluractional affix, whereas sentence (25) shows that iteration may co-occur with a pluractional affix.

(24) Kandat nakakop opokakosypi
kandat Ø-na-kop-Ø opokakosypi
a.lot 3-DECL-fall-NFUT egg
'Many eggs fell'/ 'Eggs fell may times'
Literally: 'Eggs fell many times'

(25) Kandat taso naponpon sojxaty kyn
kandat taso Ø-na-pon-pon-Ø sojxaty kyn
a.lot man 3-DECL-shoot-REDUPL-NFUT boar POS
'Men shot at boars many times'
Literally: 'An unspecified number of men shot at an unspecified number of boars many times'

Since the language already has cumulativity the following questions come up: (i) Why would a language need pluractional affixes when it has cumulativity? (ii) What is the role of pluractional affixes in the language? (iii) What would the role of adverbials like *kandat* in such a language be?

We claim that pluractional affixes in Karitiana perform a pluralization operation on cumulative verb denotations – they exclude atomic events from the denotation of verbs (cf. Ferreira 2005 for nouns and verbs and Müller 2000 for nouns). The formalization of this proposal is laid out in (26) for both transitive (a) and intransitive (b) verbs, and illustrated for the predicate *fall'* repeated in (27). The result of applying the pluralization operation to a predicate like *fall'* is that all singular falling events are excluded from its denotation as illustrated in (28).

(26) a. PL = λP <e<s,t>>λX λE [P(X)(E) & non-atomic (E)]
b. PL = λP <s,t>λE [P(E) & non-atomic (E)]
E: variable over cumulative events.

(27) [[fall'']] = {<Mary, $fall_1$>, <John, $fall_2$>,<Mary+Carlos, $fall_3$, …, <Mary+John, $fall_1$+$fall_2$>, …, <Mary+John+Carlos, $fall_1$+$fall_2$+$fall_3$>, …}

(28) PL ([[fall']]) = {<Mary+John, $fall_1$+ $fall_2$>, …,
<Mary+John+Carlos, $fall_1$+ $fall_2$+$fall_3$>, …}

Our hypothesis makes sense of the apparent puzzle posed by the existence of pluractionality in a language in which cumulativity is available in the syntactic composition for both nominal and verbal constituents. The pluractional affix means the same as the plural affix for nouns in many languages, that is, that atomic entities should be excluded from the denotation of the predicate.

The hypothesis also explains why quantifiers like *kandat* ('a lot') are not redundant with pluractional affixes. Contrary to traditional analyses of pluractional affixes, their combination with verbal predicates is not taken to express the occurrence of many events, but only of more than one event.

The claim that the pluractional operation is a plural operation on verb denotations in Karitiana makes some predictions. The first one is that pluractionality should be possible for any sentence denoting two or more events and not only for sentences denoting a significant number of events. That this is so, is shown by the use of reduplication in a sentence about two shooting events in (29).

(29)

Sypomp	nakaponpon	João	sojxaty	kyn
sypom-t	Ø-naka-pon-pon-Ø	João	sojxaty	kyn
two-OBL	3-DECL-shoot-REDUPL-NFUT	João	boar	POS

'João shot twice at boars'

The second prediction that follows from our claim is that sentences denoting a singular event should not reduplicate. Sentences (30) and (31) are about one single lifting event, and reduplication cannot be used (31). Sentence (32), without reduplication, may refer to singular or plural events, whereas sentence (33), with reduplication can only be used to express the occurrence of two or more events.

(30)

Inacio	namangat	myhint	Nadia	ka'it
Inacio	Ø-na-mangat-Ø	myhin-t	Nadia	ka'it
Inacio	3-DECL-lift-NFUT	one-OBL	Nadia	today

'Inacio lifted Nadia once today' *singular event*

(31) *Inacio namangatmangadn myhint Nadia ka'it
Inacio Ø-na-mangat-mangat-Ø myhin-t Nadia ka'it
Inacio 3-DECL-lift-REDUPL-NFUT one-OBL Nadia today
'Inacio lifted Nadia once today' *singular event*

(32) Inacio namangat Nadia ka'it
Inacio Ø-na-mangat-Ø Nadia ka'it
Inacio 3-DECL-lift-NFUT Nadia today
'Inacio lifted Nadia today (once or more)' *singular or plural event*

(33) Inacio namangatmangadn Nadia ka'it
Inacio Ø-na-mangat-mangat-Ø Nadia ka'it
Inacio 3-DECL-lift-REDUPL-NFUT Nadia today
'Inacio lifted Nadia today (more then once)' *plural event*

Sentences (34) and (35) make the same point. Sentence (34) describes the occurrence of a single collective event of giving a single canoe to João, and no reduplication is used. The same sentence, if reduplicated, may not be used to describe the same situation (35).

(34) Õwã nakahit myhint goojoty João
õwã Ø-naka-hit-Ø myhin-t goojo-ty João
kid 3-DECL-give-NFUT one-OBL canoe-POS João
'The kids gave one canoe to João' *singular event*

(35) *Õwã nakahithidn myhint goojoty João
õwã Ø-naka-hit-hit-Ø myhin-t goojo-ty João
kid 3-DECL-give- REDUPL-NFUT one-OBL canoe-POS João
'The kids gave one canoe to João' *singular event*

Another prediction that is born out is that sentences with distributive readings of singular objects should not allow pluractional affixes. This is so because one is distributing singular event predicates, and there are no singular events in the denotation of pluractional predicates. The minimal singular event of giving one canoe, for example, contains only one canoe. Any event of giving more than one canoe is not a minimal event of 'giving one canoe'. That this is so is supported by the fact that the distributive operator *tamyry tamyry* ('each…each') cannot co-occur with a pluractional affix and a singular object, which is shown by the contrast in grammaticality between sentences (36) and (37).

(36) Tamyry tamyry nakahit õwã myhint kinda'o
ta-myry ta-myry Ø-naka-hit-Ø õwã myhin-t kinda'o
3ANAPH-POS 3ANAPH-POS 3-DECL-give-NFUT kid one-OBL fruit
'Each child gave one fruit'

(37) *Tamyry tamyry nakahithidn
ta-myry ta-myry Ø-naka-hit-hit-Ø
3ANAPH-POS 3ANAPH-POS 3-DECL-give-REDUPL-NFUT

õwã myhint kinda'o
õwã myhin-t kinda'o
kid one-OBL fruit
'Each child gave one fruit'

Sentences (38) and (39) illustrate another point: that Karitiana pluractional affixes are lexical operators, not phrasal operators. The semantically plural subject of sentence (38) and (39) can only be interpreted as a collective agent. Since a collective action of building one canoe does not belong in the denotation of the reduplicated verb, sentence (39) is not interpretable.

(38) Luciana Leticia nakam'at myhint gooj
Luciana Leticia Ø-naka-m-'a-t(??) myhin-t gooj
Luciana Letícia 3-DECL-CAUS-build-NFUT one-OBL canoe
'Luciana and Leticia built one canoe'
✓ Collective reading
× Distributive reading

(39) *Luciana Leticia nakam'abyadn myhint gooj
Luciana Letícia Ø-naka-m-'a-by-'a-t myhin-t gooj
Luciana Leticia 3-DECL-CAUS-build-?-REDPL-NFUT one-obl canoe
'Luciana and Leticia built one canoe'
× Collective reading
× Distributive reading

In this section, we have provided support for the claim that pluractional markers in Karitiana effect a plural operation on verb cumulative denotations. We have also provided support for Kratzer's 2001, 2005 claim that lexical cummulativity differs from phrasal cumulativity.

6 Conclusions

We have claimed that pluractional affixes in Karitiana are plural operators on verbs: they subtract singular events from cumulative verb denotations. The occurrence of pluractional markers in the language indicates that the verb denotes two or more events.

The great array of readings that result from argument-predicate combinations in Karitiana, as illustrated by sentence (40), is due to nominal and verbal cumulativity. In (41) we present the logical form for sentence (40) in order to illustrate how the

multiplicity of readings is achieved. Since both noun and verb denotations are cumulative, the multiplicity of participants and or events is a given possibility, and whether the sentence should be interpreted as being about one or more participants or events is decided upon context.

(40) Taso naka'yt boroja
taso Ø-naka-'y-t boroja
man 3-DECL-eat-NFUT snake
Literally: 'An unspecified number of men ate an unspecified number of snakes an unspecified number of times'

(41) $\exists E \exists X \exists Y$ [killing' (X,E) & snakes' (X) & agent' (Y,E) &
men (Y) & $|E| \geq 1$]
where: E, X, Y are variables over cumulative verb and noun denotations respectively.

The Katiana facts provide evidence for a distinction between phrasal and lexical cummulativity as proposed by Kratzer 2001, 2005. Pluractional affixes operate only on verb denotations, not on VP denotations as shown by the impossibility of getting readings that depend on phrasal distributivity with the mere use of the pluractional affix.

An interesting typological question that remains to be pursued is whether there is a cross-linguistic correlation between the unavailability of singular/plural distinctions for nouns and its availability for verbs.

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Reflexivity and Reciprocity with(out) Underspecification *

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Abstract

In languages like English, reflexivity and reciprocity are expressed by distinct proforms. However, many languages, such as Cheyenne, express reflexivity and reciprocity with a single proform. In this paper I utilize Dynamic Plural Logic (van den Berg, 1996) to a draw a semantic parallel between reflexive and reciprocal anaphors in English. I propose that they contribute overlapping but distinct requirements on the relations introduced by transitive verbs, requirements which fully specify reflexivity and reciprocity. This parallel is then extended to Cheyenne by appealing to underspecification. I propose the Cheyenne affix which expresses both reflexivity and reciprocity contributes only the shared requirement of the English anaphors. It is thus underspecified, not ambiguous. This accounts for its compatibility with both singular and plural antecedents as well as its variety of construals.

1 Introduction

Reflexivity and reciprocity in English are expressed by means of distinct reflexive and reciprocal anaphors. While these anaphors have been treated as a natural class by many syntactic theories (Lees and Klima, 1963; Pollard and Sag, 1992, a.o.), their semantic connection has received little attention in formal semantics. Most studies focus on reciprocals (Heim, Lasnik, and May, 1991; Schwarzschild, 1996; Dalrymple et al., 1998, a.o.), though some studies have begun to explore the formal relationship between reflexives and reciprocals (Langendoen and Magloire, 2003; Faller, 2007, a.o.).

Unlike English, many languages express both reflexivity and reciprocity with a single proform (Maslova, *to appear*; Langendoen and Magloire, 2003). One such language is Cheyenne (Algonquian), which expresses both with the verbal affix *-ahte*. In addition to reflexive and reciprocal construals, *-ahte* allows a mixed construal, which is partially reflexive and partially reciprocal.

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In this paper I propose an analysis of reflexivity and reciprocity in Dynamic Plural Logic (van den Berg, 1996) which draws a semantic parallel both within a language and cross-linguistically. In Section Two, I introduce and illustrate a fragment of Dynamic Plural Logic, focusing on the modified definition of an information state as a *set* of assignment functions. This unique way of modellng information states allows for a distinction between global and dependent values for variables. Utilizing this distinction, I then give an analysis of transitive verbs which accounts for their collective, cumulative, and distributive readings.

In Section Three I propose an analysis of English reflexives and reciprocals which treats them as anaphors that elaborate on the relations introduced by the verb, which can be collective, cumulative, or distributive. I draw a semantic parallel between reflexive and reciprocal anaphors by again utilizing the distinction between global and dependent values: the anaphors share a requirement on global values but have differing requirements on dependent values. These anaphors are treated as being fully specified for reflexivity and reciprocity. However, their proposed translations are general enough to allow for their variety of interpretations.

In Section Four, I appeal to underspecification to extend this semantic parallel to Cheyenne, a language which expresses both reflexivity and reciprocity with a single proform. I argue that such proforms have the same requirement on global values as the English anaphors. However, unlike the English anaphors, they lack any requirement on dependent values. These proforms are thus underspecified for reflexivity and reciprocity, not ambiguous. This accounts for their compatibility with both singular and plural antecedents, their variety of construals, and the possibility of *mixed elaboration*. Section Five is the conclusion.

2 Framework: Dynamic Plural Logic

In this section I introduce a fragment of Dynamic Plural Logic (van den Berg, 1996; henceforth DPlL) – an extension of Dynamic Predicate Logic (Groenendijk and Stokhof, 1991; henceforth DPL) developed to model pluralities and the anaphoric dependencies between them.

In §2.1 I discuss the general properties of this system, focusing on the modelling of an information state as a set of assignment functions, and highlight the DPlL distinction between global and dependent values for variables. Transitive verbs are then analyzed in §2.2, making use of this distinction to account for their collective, cumulative, and distributive readings as well as their various scope options. DPlL definitions are given in the Appendix.

2.1 Overview of the framework

As in DPL, formulae in DPlL denote relations between information states. However, in DPlL the notion of information state is modified to represent dependencies between variables as well as their values. Whereas a DPL information state is a (total) assignment function, a DPlL information state is a *set* of (partial) assignment functions that each assign at most one (atomic) individual to each variable. Such *plural information states* assign a (possibly empty) set to each variable. This set is the collection of values assigned to that variable by the individual functions in that information state.

For example, in the extension of DPL to pluralities in Kamp and Reyle (1993), $\{\mathtt{a},\mathtt{b}\}$ would be assigned to x, $\{\mathtt{c},\mathtt{d}\}$ to y, and $\{\mathtt{e}\}$ to z by a single assignment function that assigns sets to each variable: $g = \{\langle x,\{\mathtt{a},\mathtt{b}\}\rangle,\langle y,\{\mathtt{c},\mathtt{d}\}\rangle,\langle z,\{\mathtt{e}\}\rangle\}$.

In DPlL, these same values would be assigned to these variables by a set of assignment functions, each of which assigns only a single (atomic) individual to each variable. One such information state is $G = \{\{\langle x,\mathtt{a}\rangle,\langle y,\mathtt{c}\rangle,\langle z,\mathtt{e}\rangle\},\{\langle x,\mathtt{b}\rangle,\langle y,\mathtt{d}\rangle,\langle z,\mathtt{e}\rangle\}\}$. This information state can also be written as $G = \{g_1, g_2\}$ where $g_1 = \{\langle x,\mathtt{a}\rangle,\langle y,\mathtt{c}\rangle,\langle z,\mathtt{e}\rangle\}$ and $g_2 = \{\langle x,\mathtt{b}\rangle,\langle y,\mathtt{d}\rangle,\langle z,\mathtt{e}\rangle\}$. These information states are graphically represented as matrices in (1), below.

(1) Information states: assignment function vs. set of assignment functions

	x	y	z
g	$\{\mathtt{a},\mathtt{b}\}$	$\{\mathtt{c},\mathtt{d}\}$	$\{\mathtt{e}\}$

DPL

G	x	y	z
g_1	a	c	e
g_2	b	d	e

DPlL

Information states in DPlL allow *global values* and *dependent values* to be distinguished. The global value of a variable is the set of values assigned to that variable by the entire information state (e.g., the global value of y in (1) is $G(y) = \{\mathtt{c},\mathtt{d}\}$). A dependent value of a variable is a subset of its global value, assigned to that variable by a *sub-state* – the information state restricted to a particular value for another variable. For example, there are two x-singular sub-states in (1), $G|_{x=\mathtt{a}}$ and $G|_{x=\mathtt{b}}$, and thus two x-dependent y-values: $G|_{x=\mathtt{a}}(y) = \{\mathtt{c}\}$ and $G|_{x=\mathtt{b}}(y) = \{\mathtt{d}\}$. DPlL information states can assign the same global values to variables but differ on their dependent values, as in (2), below.

(2) Same global values, different dependent values

G	x	y	z
g_1	a	c	e
g_2	b	d	e

G'	x	y	z
g'_1	a	d	e
g'_2	b	c	e

G''	x	y	z
g''_1	a	c	e
g''_2	b	d	e
g''_3	b	c	e

The three information states in (2) agree on the global values for x, y, and z: they each assign $\{\mathtt{a},\mathtt{b}\}$ to x, $\{\mathtt{c},\mathtt{d}\}$ to y, and $\{\mathtt{e}\}$ to z. However, the information states assign different dependent values to the variables. Though they differ on the number of assignment functions, each of the information states in (2) has two x-singular sub-states, $G|_{x=\mathtt{a}}$ and $G|_{x=\mathtt{b}}$. However, these sub-states differ from state to state. For example, the b-singular sub-states assign different values to y in each state: $G|_{x=\mathtt{b}}(y) = \{\mathtt{d}\}$ while $G'|_{x=\mathtt{b}}(y) = \{\mathtt{c}\}$ and $G''|_{x=\mathtt{b}}(y) = \{\mathtt{c},\mathtt{d}\}$.

These different dependent values represent different dependencies. G represents a dependency between b and d while G' encodes a dependency between b and c. G'' encodes the same relation between b and d as G as well as an additional relation between b and c.

Because the plural information states of DPlL can represent dependencies between variables – relations between individual members of pluralities – dependencies as well as values are passed on from state to state and from sentence to sentence. This feature of DPlL is utilized in the analysis of transitive verbs in §2.2 as well as in the analysis of reflexivity and reciprocity in English (§3) and Cheyenne (§4).

2.2 Collectivity, cumulativity, and distributivity

Sentences with plural subjects and objects can be read collectively, cumulatively, or distributively (Scha, 1981, a.o.) On distributive readings, the distributive operator can take either wide or narrow scope with respect to the object. This allows four readings of (3), which can be disambiguated as in (4).[1]

(3) Sandy and Kathy lifted four boxes.

(4) Sandy and Kathy ...

a. ... *together* lifted (a stack of) four boxes. (collective)
b. ... *between* them lifted (a total of) four boxes. (cumulative)
c. ... *each* lifted *the same* (stack of) four boxes. (narrow dist.)
d. ... *each* lifted a *possibly different* (stack of) four boxes. (wide dist.)

Assuming that there is an optional operator that distributes over the subject (δ_x) and that the scope of this operator may vary, these four readings can be accounted for in DPlL as in (5).

(5) Four translations of *lift*[2]

a. $lift^y_x \rightsquigarrow \epsilon_y \wedge Lxy$ (collective)
b. $lift^y_{\delta_x} \rightsquigarrow \delta_x(\epsilon_y) \wedge Lxy$ (cumulative)
c. ${}_{\delta_x}(lift)^y \rightsquigarrow \epsilon_y \wedge \delta_x(Lxy)$ (narrow dist.)
d. ${}_{\delta_x}(lift^y) \rightsquigarrow \delta_x(\epsilon_y \wedge Lxy)$ (wide dist.)

I assume the input to semantic composition to be an indexed string of morphemes interpreted left to right, where the translations are combined by dynamic conjunction (adapting Bittner (2007)). In the indexed form, superscripts introduce new values for variables, subscripts indicate anaphora to the input values, δ_x indicates distribution over x, and the indices x and y stand for the subject set and the object set, respectively. In DPlL, ϵ_y introduces values for the variable y.

When the object is introduced in the scope of distributivity ($\delta_x(\epsilon_y)$), as in (5b,d), different y-values can be introduced for each x-value. That is, dependencies between variables x and y can be introduced. This allows for a representation of Sandy and Kathy picking up different boxes on the cumulative and wide distributive readings (4b,d). On the cumulative reading there is a total of four boxes while on the wide distributive reading there can be between four and eight.

When the object is introduced outside the scope of the distributivity operator, as in (5a,c), the y-values must be the same for all x-values. That is, no dependencies can be introduced, requiring these two readings to have the same assignment structures. This allows for a representation of Sandy and Kathy picking up the same four boxes on the collective and the narrow distributive readings (4a,c). Possible assignment structures for the different readings of (3) are given in (6).

[1] In this section I discuss only *subject-distributive* readings – readings where the distribution is over the subject. There can also be distribution over the object, yielding four additional readings of (3). These additional readings are parallel to the ones in (4) but the boxes are lifted *one at a time*.

[2] C.f. van den Berg (1996, §5.4.2), who analyzes these using a 'pseudo-distributivity' operator which, for both the distributive and cumulative readings, scopes over both the variable introduction and the verb.

(6) Possible assignment structures for (3)

G	x	y
g_1	s	b_1
g_2	s	b_2
g_3	k	b_3
g_4	k	b_4

cumulative

G'	x	y
g'_1	s	b_1
g'_2	s	b_2
g'_3	s	b_3
g'_4	s	b_4
g_5	k	b_5
g'_6	k	b_6
g'_7	k	b_7
g'_8	k	b_8

wide dist.

G''	x	y
g''_1	s	b_1
g''_2	s	b_2
g''_3	s	b_3
g''_4	s	b_4
g''_5	k	b_1
g''_6	k	b_2
g''_7	k	b_3
g''_8	k	b_4

collective, narrow dist.

DPlL information states represent relations between individuals, but these don't necessarily correlate with the predicate relations. Independent requirements imposed by a predicate determine what pairs, or n-tuples, are in its extension. For example, when the verbal relation is outside the scope of distributivity, as in (5a,b), the pair of the global value of x and the global value of y is required to be in the extension of the verb. On the collective and cumulative readings (4a,b), this requires $\langle\{\mathtt{s},\mathtt{k}\},\{\mathtt{b}_1,\mathtt{b}_2,\mathtt{b}_3,\mathtt{b}_4\}\rangle$ to be in $[\![L]\!]$, representing that the plurality of Sandy and Kathy picked up the plurality of the boxes.

When the verbal relation is in the scope of distributivity, as in (5c,d), each x-value is required to be paired with its dependent y-values in the extension of the verb. (For an input information state G and a verbal relation V, for every d in $G(x)$, the pair $\langle\{d\},G|_{x=d}(y)\rangle$ is required to be in $[\![V]\!]$.) For the wide distributive assignment structure G' in (6), this requires that both $\langle\{\mathtt{s}\},\{\mathtt{b}_1,\mathtt{b}_2,\mathtt{b}_3,\mathtt{b}_4\}\rangle$ and $\langle\{\mathtt{k}\},\{\mathtt{b}_5,\mathtt{b}_6,\mathtt{b}_7,\mathtt{b}_8\}\rangle$ are in $[\![L]\!]$, representing that Sandy picks up her four boxes and Kathy picks up hers.

These four readings of (3) are translated into DPlL as in (7). The translation of the subject is the same for all readings – the difference in meaning comes entirely from the VP. The NP (7i) and the VP (7ii) are to be combined by dynamic conjunction ($\wedge$).

(7) i. *Sandy and Kathy* ... $\rightsquigarrow$
$+[v=s] \wedge \epsilon_x \wedge x = v \oplus w \wedge +[w=k]$

ii. ... *lifted four boxes* $\rightsquigarrow$
$\epsilon_y \wedge Lxy \wedge 4y \wedge \delta_y(By)$ (collective)
$\delta_x(\epsilon_y) \wedge Lxy \wedge 4y \wedge \delta_y(By)$ (cumulative)
$\epsilon_y \wedge \delta_x(Lxy) \wedge 4y \wedge \delta_y(By)$ (narrow dist.)
$\delta_x(\epsilon_y \wedge Lxy) \wedge \delta_x(4y) \wedge \delta_x(\delta_y(By)))$ (wide dist.)[3]

The dependencies between x and y are introduced by the verb (through the introduction of values for the variable y); subsequent conditions are tests, elaborating on these dependencies by filtering out incompatible information states. These dependencies are then passed on to subsequent

[3]Since distribution is down to singularities (x-singular sub-states), the wide distributive translation in (7ii) is equivalent to a formulation with distributivity scoped over the entire VP: $\delta_x(\epsilon_y \wedge Lxy \wedge 4y \wedge \delta_y(By))$, representing that the object is read distributively. The object may also be read collectively, as in (11b).

discourse, as noted by van den Berg (1996). For example, in the context of the wide distributive reading of (3), where Sandy and Kathy each have their own stack of four boxes, the sentence *They brought them upstairs* is read analogously, where Sandy brought her stack of four boxes upstairs and Kathy brought her stack of four boxes upstairs.

3 Reflexive and Reciprocal Specification

Some languages, such as English, express reflexivity and reciprocity by means of distinct proforms. For example, English *themselves* expresses reflexivity while *each other* expresses reciprocity. In this section, I analyze such anaphors as elaborating on the dependencies introduced by the verb. I draw a semantic parallel between them by proposing that they share an identity requirement on global values (*global identity*) but differ in their requirements on dependent values (*distributive overlap* vs. *distributive non-overlap*).

In §3.1 I give the proposed translation of the plural reflexive and reciprocal anaphors and discuss the different interpretations that they account for. In §3.2 I extend the analysis to singular reflexives and explain why the proposed analysis of reciprocals predicts that they are incompatible with singular subjects. In §3.3 I discuss several alternate translations of the anaphors and explain why they are inadequate. Finally, in §3.4 I discuss some examples of reciprocals in discourse which show that the relations specified by these anaphors are passed on from sentence to sentence, determining the interpretation of subsequent anaphors.

3.1 Plural anaphors

In this section, I propose meanings for the English plural reflexive and reciprocal anaphors which account for a variety of their interpretations. Only one translation of each anaphor is given– their various interpretations can be derived from independent factors, such as differing translations of the verb and the way that DPlL models plurality. The proposed translations of the plural reflexive and reciprocal are given in (8) and (9) respectively.

(8) $\textit{themselves}_{y,x} \quad \rightsquigarrow \quad +[PLy] \wedge +[y = x] \wedge +[\delta_y(y \bigcirc x)]$

(9) $\textit{each other}_{y,x} \quad \rightsquigarrow \quad +[y = x] \wedge +[\delta_y(y \oslash x)]$

According to (8), the plural reflexive presupposes (+) plurality, like non-reflexive plural pronouns, as well as global identity ($+[y = x]$) and distributive overlap ($+[\delta_y(y \bigcirc x)]$). The reciprocal (9) has two presuppositions: global identity, like reflexives, and distributive non-overlap ($+[\delta_y(y \oslash x)]$). The shared presupposition of global identity requires that two arguments of the verb (here, the subject x and the object y) denote the same set. The distributive conditions impose further constraints on the dependencies between x and y that were introduced by the verb.

Consider the plural reflexive sentence in (10).

(10) Some students helped themselves

The collective and distributive readings of (10) can be accounted for with a single translation of the reflexive anaphor. All that need vary is the translation of the verb, as in (11) (where $S = \textit{student}$ and $H = \textit{help}$). (11a) is the translation of the collective interpretation, where the group of students helped the group; (11b) is the translation of the distributive interpretation, where each student in the group helped (at least) himself.

(11) a. $\epsilon_x \wedge \delta_x(Sx) \wedge PLx \wedge \epsilon_y \wedge Hxy \wedge +[PLy] \wedge +[y = x] \wedge +[\delta_y(y \bigcirc x)]$
b. $\epsilon_x \wedge \delta_x(Sx) \wedge PLx \wedge \delta_x(\epsilon_y \wedge Hxy) \wedge +[PLy] \wedge +[y = x] \wedge +[\delta_y(y \bigcirc x)]$

The distributive translation (11b) requires that each student is paired with himself, but allows additional pairings, making it compatible with several assignment structures. For students $\{\mathtt{a}, \mathtt{b}\}$, (11b) is compatible with each of the information states in (12). The collective translation (11a), however, is compatible only with the one with no dependencies between variables (G''' in (12)).

(12) Assignment structures for (11)

G	x	y
g_1	a	a
g_2	b	b

G'	x	y
g'_1	a	a
g'_2	b	a
g'_3	b	b

G''	x	y
g''_1	a	a
g''_2	a	b
g''_3	b	b

G'''	x	y
g'''_1	a	a
g'''_2	a	b
g'''_3	b	a
g'''_4	b	b

While the English reflexive *themselves* is specified for reflexivity, on the distributive reading it does not specify how many relations must hold between the individual members of the plurality. This underspecification allows (10) to be true in a variety of situations. The same is true for the English reciprocal: it is fully specified for reciprocity, but the number of relations between the individuals can vary. Consider the reciprocal sentence in (13).

(13) Some students helped each other

Sentence (13) can be true in a wide variety of situations, including ones where each student helped one other student, some other students, or every other student, and ones where in addition he helped himself. All of these situations are allowed by the DPlL translation in (14), which uses the distributive translation of the verb – there is no (subject-)collective reading of (13) (see §3.3).

(14) $\epsilon_x \wedge \delta_x(Sx) \wedge PLx \wedge \delta_x(\epsilon_y \wedge Hxy) \wedge +[y = x] \wedge +[\delta_y(y \oslash x)]$

Translation (14) requires that the x and y sets are identical and that each y-value (student) is assigned a non-overlapping dependent x-value (is paired with at least one other student and not himself). This later requirement – the distributive non-overlap condition – requires only as many relations as there are members of the antecedent set. It allows, but does not require, any number of additional relations between members of that set, accounting for the various interpretations of (13). Correspondingly, (14) is compatible with several assignment structures, including the ones in (15) for students $\{\mathtt{a}, \mathtt{b}, \mathtt{c}\}$. While the distributive non-overlap requirement rules out assignment structures which pair an individual with itself, (14) is still true in a situation where a student additionally helped himself (see definition (D4) in the appendix).

(15) Possible assignment structures for (14)

G	x	y
g_1	a	b
g_2	b	c
g_3	c	a

G'	x	y
g'_1	a	b
g'_2	b	c
g'_3	b	a
g'_4	c	a

G''	x	y
g''_1	a	b
g''_2	a	c
g''_3	b	c
g''_4	b	a
g''_5	c	a
g''_6	c	b

3.2 Singular anaphors

The analysis proposed in the previous section can be extended to singular reflexive anaphors, e.g. *himself*, by means of a simple modification. The translation of the singular reflexive pronoun, given in (16), differs from the plural, (8), only in the number presupposition.

(16) $\textit{himself}_{y,x} \quad \rightsquigarrow \quad +[SGy] \wedge +[y = x] \wedge +[\delta_y(y \bigcirc x)]$

There is only one interpretation of singular reflexive sentences such as *The student helped himself*. There is also only one assignment structure for the corresponding translation of this sentence: the assignment structure where the member of the antecedent set is mapped to itself. This analysis also predicts a presupposition conflict for sentences with number disagreement between the antecedent and the reflexive anaphor, e.g. *#The students helped himself*.

The above analysis of reciprocals in §3.1 predicts that they are not compatible with singular antecedents, e.g. *#The student helped each other*. With a singular antecedent, the presuppositions of the reciprocal, global identity ($+[y = x]$) and distributive non-overlap ($+[\delta_y(y \oslash x)]$), cannot be both satisfied. Specifically, when the antecedent denotes a singleton, the member of the antecedent set will be mapped to itself, and the distributive non-overlap condition will fail.

3.3 Alternate translations

In this section I discuss several possible alternate translations of the reflexive and reciprocal proforms, all of which turn out to be inadequate. Translations without global identity, as in (17), would incorrectly allow for different members in the x and y sets.

(17) a. $\textit{themselves}_{y,x} \quad \rightsquigarrow \quad +[PLy] \wedge +[\delta_y(y \bigcirc x)]$
b. $\textit{each other}_{y,x} \quad \rightsquigarrow \quad +[\delta_y(y \oslash x)]$

The translation of the plural reflexive in (17a) incorrectly allows for the y set to be a proper subset of the x set. The translation of the reciprocal in (17b) incorrectly allows for sets y and x to be disjoint, additionally incorrectly permitting both sets to be singletons (see §3.2).

A translation of the reflexive with distributive identity instead of overlap, as in (18a), is too strong, while the reciprocal with non-identity instead of non-overlap, (18b), is too weak.

(18) a. *themselves* $_{y,x}$ $\leadsto$ $+[PLy] \wedge +[y = x] \wedge +[\delta_y(y = x)]$
b. *each other*$_{y,x}$ $\leadsto$ $+[y = x] \wedge +[\delta_y(y \neq x)]$

The translation in (18a) incorrectly precludes a collective interpretation of the reflexive (e.g., *The students praised themselves*) because it is incompatible with a collective interpretation of the verb. The last conjunct of (18a) requires that each member of the y set is assigned only itself; however, this is incompatible with the collective verb's requirement that there be no dependencies between variables.[4]

The translation in (18b) incorrectly predicts a subject-collective interpretation of the reciprocal because (18b) is compatible with the collective interpretation of the verb. For example, it would predict a reading of *The window-washers lifted each other* where the entire x group together lifts the entire group (all on a scaffold, each pulling a rope – true on a collective reading of the *reflexive*).

3.4 Elaboration by subsequent discourse

The above analysis treats reflexive and reciprocal anaphors as sentence-internal elaborations on the dependencies introduced by the verb. But, these relations can also be elaborated on by subsequent discourse. Consider for example the discourse in (19): both (19ii) and (19iii) depend on the relations introduced in (19i) by the verb and elaborated on by the reciprocal object.

(19) i. Some girls dressed up like each other (for Halloween).
ii. They borrowed outfits from each other.
iii. The next day they returned them.

Each girl in the antecedent set borrowed an outfit from the girl she dressed up as and returned that outfit to that girl. Crucially, the representation of both the plurality of girls and the relations between them are passed on from (19i) to the subsequent discourse. If only the values were passed on, then the relations between the individual girls could be reassigned in subsequent sentences. These observations are captured by the analysis of discourse (19) given in (20), where $G = girl$, $D = dress.up.like$, $B = borrow.from$, $O = outfit$, and $R = return$.

(20) i. $\epsilon_x \wedge \delta_x(Gx) \wedge PLx \wedge \delta_x(\epsilon_y \wedge Dxy) \wedge +[y = x] \wedge +[\delta_y(y \oslash x)]$
ii. $+[PLx] \wedge \delta_x(\epsilon_z \wedge Bxzy) \wedge \delta_z(Oz) \wedge PLz \wedge +[y = x] \wedge +[\delta_y(y \oslash x)]$
iii. $+[PLx] \wedge \delta_x(Rxzy) \wedge +[PLz]$

One might argue that pragmatic reasoning may independently provide the relevant pairings for discourse (19). Though possible for (19), this is not always the case. Consider the related example in (21), whose only interpretation is pragmatically odd.

(21) i. Some girls dressed up like each other (for Halloween).
ii. They didn't know each other.

[4]The translation in is also incompatible with the narrow distributive; see §2.2 for more on translations of verbs.

Discourse (21) means that each girl in the group didn't know the girl she dressed up as (perhaps receiving her outfit by a random exchange over the internet). Crucially, (21) cannot mean that each girl dressed up as one other girl but didn't know a *different* girl. However, if the reciprocal relations could be assigned in each sentence, this interpretation should be available, and possibly pragmatically favored.

There are also examples where pragmatic reasoning suggests certain pairings and yet these are not accessible to the reciprocal. One such example is *Two rival teams just merged. The athletes like each other but they dislike each other.* This discourse sounds contradictory. There is no reading of it where the members of the one team like each other but dislike members of the other team. Such a scenario, however, is possible, and in fact made salient by the first sentence of the discourse.

Examples such as these show that plural reflexives and reciprocals are anaphoric not only to their antecedent pluralities but also to relations between the members of those pluralities.

4 Reflexive/Reciprocal Underspecification

While English expresses reflexivity and reciprocity with distinct proforms, many languages express reflexivity and reciprocity with a single proform. One such language is Cheyenne, which expresses both with the verbal affix *-ahte*. With a plural antecedent, Cheyenne *-ahte* allows reflexive, reciprocal, and mixed construals (§4.1) but only allows a reflexive construal with singular antecedents (§4.2). With plural antecedents, a reciprocal construal can be specified with an additional modifier (§4.3) and a mixed construal can be specified in subsequent discourse by mixed elaboration (§4.4).

4.1 Plural antecedents

The Cheyenne verbal affix *-ahte* is compatible with both singular and plural antecedents. When used with a plural antecedent, as in (22)[5], Cheyenne *-ahte* allows a reflexive construal, translated into English as (23), as well as a reciprocal construal, translated into English as (24).

(22) *Ka'ëškóne-ho é-axeen-**ahtse**-o'o*
child-PL.AN 3-scratch.AN-*ahte*-3PL.AN

(23) Some children scratched *themselves*

(24) Some children scratched *each other*

In addition to allowing both a reflexive and a reciprocal construal, Cheyenne (22) allows a mixed construal, which is partially reflexive and partially reciprocal. On a mixed construal, which is difficult to translate into English, (22) can refer to a group of children, some of whom scratched each other while others scratched themselves.

[5]Cheyenne abbreviations are AN := animate, CNJ := conjunction, and NON.ID := non-identity

I propose that proforms such as Cheyenne *-ahte* in (22) are underspecified for reflexivity and reciprocity. They can be analyzed as having only the global identity presupposition of the English reflexive and reciprocal anaphors, as in the translation in (25).

(25) *-ahte* $\rightsquigarrow$ $+[y = x]$

For plural antecedents, (25) does not specify what relations must hold between the members of the antecedent set, as the English anaphors do. This underspecification allows for various construals. Cheyenne *-ahte* is compatible with all translations of the verb; the distributive translation of (22) into DPlL is given in (26), where $C = child$, and $S = scratch$.

(26) $\epsilon_x \wedge \delta_x(Cx) \wedge PLx \wedge \delta_x(\epsilon_y \wedge Sxy) \wedge +[y = x]$

The translation in (26) is compatible with various assignment structures. For example, for children $\{\mathsf{c}_1, \mathsf{c}_2, \mathsf{c}_3\}$, (26) is compatible with the information states in (27).

(27) Possible assignment structures for (26)

G	x	y
g_1	c_1	c_1
g_2	c_2	c_2
g_3	c_3	c_3

G'	x	y
g'_1	c_1	c_2
g'_2	c_2	c_3
g'_3	c_3	c_1

G''	x	y
g''_1	c_1	c_1
g''_2	c_2	c_3
g''_3	c_3	c_2

In (27), information state G corresponds to the reflexive construal, G' to the reciprocal construal, and G'' to the mixed construal, where c_1 is mapped to itself and c_2 and c_3 are mapped to each other. Several other assignment structures are compatible with (26), all of which are supersets of the information states in (27).

4.2 Singular antecedents

Cheyenne *-ahte* is also compatible with singular antecedents, as in (28). There is (unmarked) singular agreement on the noun and verb, which is sufficient to specify a reflexive interpretation.

(28) *Hetané-ka'ėškóne é-axeen-**ahtse***
man-child 3-scratch.AN-*ahte*
'A boy scratched himself.'

Cheyenne (28) has only a reflexive interpretation, where the boy denoted by the subject scratched himself. The proposed translation of *-ahte* in (25) accounts for this. Since the subject in (28) is singular, x is assigned a singleton set. The contribution of *-ahte* requires identical subject (x) and object (y) sets, so y will be assigned the same singleton as x, yielding a reflexive interpretation. The translation of (28) into DPlL is given in (29).

(29) $\epsilon_x \wedge \delta_x(Cx) \wedge SGx \wedge \delta_x(\epsilon_y \wedge Sxy) \wedge +[y = x]$

The translation in (29) differs from (26) only in the number presupposition. However, (29) only allows one type of assignment structures – ones with identical singleton sets assigned to x and y.

4.3 Specification of reciprocity

The underspecified Cheyenne sentence in (22) can be modified to specify a reciprocal construal. This is achieved by the addition of a preposed verbal modifier, as in (30).

(30) *He'é-ka'ėškóne-ho noná-mé'tó'e é-axeen-**ahtse**-o'o*
woman-child-PL.AN *noná*-NON.ID 3-scratch.AN-*ahte*-3PL.AN
'The girls scratched each other.'

I propose to analyze this modifier as contributing the distributive non-overlap condition of the English reciprocal, as in (31). The translation of (30) into DPlL is given in (32).

(31) *noná-mé'tó'e* $\rightsquigarrow$ $+[\delta_y(y \oslash x)]$

(32) $\epsilon_x \wedge \delta_x(Cx) \wedge PLx \wedge \delta_x(\epsilon_y) \wedge +[\delta_y(y \oslash x)] \wedge \delta_x(Sxy) \wedge +[y = x]$

(32) is just the translation of the underspecified case (26) with the addition of (31), interpreted from left to right, assuming that *noná-mé'tó'e*, as the first item to reference the object, introduces the object variable($\delta_x(\epsilon_y)$). It is equivalent to the translation in (14) of the English reciprocal sentence (13), modulo predicate differences, and allows the same range of assignment structures.

4.4 Mixed elaboration

A mixed construal of underspecified Cheyenne (22) is compatible with mixed elaboration – the specification in subsequent discourse of different relations for different subgroups of the antecedent. This is exemplified by the discourse in (33), where the first sentence (33i) is (22) and the second sentence (33ii) is the conjunction of (28) and (30).

(33) i. *Ka'ėškóne-ho é-axeen-**ahtse**-o'o*
child-PL.AN 3-scratch.AN-*ahte*-3PL.AN
ii. *Hetané-ka'ėškóne é-axeen-**ahtse***
man-child 3-scratch.AN-*ahte*
*naa he'é-ka'ėškóne-ho noná-mé'tó'e é-axeen-**ahtse**-o'o*
CNJ woman-child-PL.AN *noná*-NON.ID 3-scratch.AN-*ahte*-3PL.AN

The conjunction (33ii) is a *mixed elaboration* of (33i): it specifies different relations for different subgroups of the children. Specifically, when 'some children' in the first sentence denotes a set of a boy and two girls ($\{\mathtt{c}_1, \mathtt{c}_2, \mathtt{c}_3\}$), (33ii) specifies a reflexive relation for the (singular) subgroup of the boy ($\{\mathtt{c}_1\}$) and a reciprocal relation for the subgroup of the girls ($\{\mathtt{c}_2, \mathtt{c}_3\}$). The translation of (33) into DPlL – the dynamic conjunction of (26), (29), and (32) – allows only a *mixed* assignment structure (G'' in (27)), just one of the structures possible for (22).

The Cheyenne discourse (33) is difficult to translate into English. The least awkward translation is (34), where Cheyenne (33i) is rendered as (34i), without any object.

(34) i. Some children *were scratching*.
ii. The boy scratched *himself* and the girls scratched *each other*.

(35) i. Some children scratched { *themselves* / *each other* }
ii. #The boy scratched *himself* and the girls scratched *each other*.

If there is a reflexive or reciprocal object, as in (35i), then mixed elaboration is infelicitous (#).[6] The proposed analysis accounts for this because the English reflexive and reciprocal anaphors are fully specified. If the relations between the members of the antecedent are specified in the first sentence, subsequent discourse can not specify different relations. By the same reasoning, the mixed elaboration discourse in (33) rules out an ambiguity analysis of Cheyenne *-ahte*.

Though there is no direct translation of Cheyenne (33) into English, parallel discourses are acceptable in other languages which express reflexivity and reciprocity with a single proform. This holds regardless of the morphological category of that proform – it can be an affix, as with Cheyenne *-ahte*, a clitic, or an independent word. Additional examples of such proforms are Polish *się* (M. Bittner, p.c.), Romanian *se* (A. Brasoveanu, p.c.), French *se* (V. Déprez, p.c.), Spanish *se* (C. Fasola, p.c.), and German *sich* (J. Tonhauser, p.c.). The above proposal is a step toward understanding what appears to be a robust cross-linguistic pattern.

5 Conclusion

The DPlL distinction between global and dependent values allows a semantic parallel to be drawn between English reflexive and reciprocal anaphors. The anaphors share a requirement on global values (global identity) but differ in requirements on dependent values (distributive overlap and distributive non-overlap, respectively). Each anaphor is fully specified for reflexivity and reciprocity, but their translations are general enough to allow a variety of interpretations.

By appealing to underspecification, this semantic parallel can be extended to languages such as Cheyenne that express reflexivity and reciprocity with a single proform. Like the English anaphors, these underspecified proforms presuppose global identity. However, unlike the English anaphors, they have no further requirements on dependent values – they do not specify what sort of relations must hold between the individual members of the antecedent set. This accounts for their variety of construals with plural antecedents, the specification to reflexivity with singular antecedents, and the possibility of mixed elaboration.

The cross-sentential interactions of reflexivity and reciprocity in both English and Cheyenne show the need for a richer notion of context, one which represents the dependencies between variables as well as their values (see Nouwen, 2003; Brasoveanu, 2007, a.o.).

[6] A discourse like (35) may be acceptable with 'themselves' on a collective interpretation. The proposed analysis of reflexives is compatible with collective translation of the verb: see §2 and §3.

Appendix: Dynamic Plural Logic, Definitions [7, 8]

(D1) u-to-d Alternatives and u-Alternatives

- $g[u/d] = h$ iff $(\text{Dom } g \cup \{u\}) = \text{Dom } h \;\&\; h(u) = d \;\&\; \forall u' \in (\text{Dom } g - \{u\}) : g(u') = h(u')$
- $g \approx_u h$ = $\exists d \in D^{\mathcal{M}} : g[u/d] = h$

(D2) Global Values, State Restriction, and Variable Introduction

- $G(u)$ = $\{g(u) \mid g \in G \;\&\; g(u) \neq \star\}$
- $G|_{u=d}$ = $\{g \in G \mid g(u) = d\}$
- $G|_{u=\star}$ = $\{g \in G \mid g(u) = \star\}$
- $G[u/D]$ = $\{g[u/d] \mid g \in G \;\&\; d \in D\}$
- $G \approx_u H$ iff $\exists D : G[u/D] = H$

(D3) Semantics of DPlL

- $G[\![\epsilon_u]\!]H = \top$ iff $G \approx_u H \;\&\; G(u) = \varnothing$
- $G[\![\alpha]\!]$ = $G(\alpha)$ if α is a variable, $\{[\![\alpha]\!]\}$ if α is a constant
- $G[\![\alpha_1 \oplus \alpha_2]\!]H$ = $G[\![\alpha_1]\!] \cup G[\![\alpha_2]\!]$
- $G[\![\beta\,\alpha_1 \ldots \alpha_n]\!]H = \top$ iff $G = H \;\&\; \langle G[\![\alpha_1]\!], \ldots, G[\![\alpha_n]\!]\rangle \in [\![\beta]\!]$
- $G[\![SG\alpha]\!]H = \top$ iff $G = H \;\&\; |G[\![\alpha]\!]| = 1$
- $G[\![PL\alpha]\!]H = \top$ iff $G = H \;\&\; |G[\![\alpha]\!]| > 1$
- $G[\![\alpha_1 = \alpha_2]\!]H = \top$ iff $G = H \;\&\; G[\![\alpha_1]\!] = G[\![\alpha_2]\!]$
- $G[\![\alpha_1 \subseteq \alpha_2]\!]H = \top$ iff $G = H \;\&\; G[\![\alpha_1]\!] \subseteq G[\![\alpha_2]\!]$
- $G[\![\phi \wedge \psi]\!]H = \top$ iff $\exists K : G[\![\phi]\!]K = \top \;\&\; K[\![\psi]\!]H = \top$
- $G[\![+[\phi]]\!]H = \top$ if $G[\![\phi]\!]H = \top$

(D4) Definition of Truth with respect to an Input State I

- $\models_{\mathcal{M},I} \phi$ iff $\exists K : I[\![\phi]\!]K = \top$

(D5) Definition of Distributivity, Overlap, and Non-overlap

- $G[\![\delta_x(\phi)]\!]H = \top$ iff $G(x) = H(x) \;\&\; G|_{x=\star} = H|_{x=\star} \;\&\; \forall d \in G(x) : G|_{x=d}[\![\phi]\!]H|_{x=d} = \top$
- $G[\![\alpha_1 \bigcirc \alpha_2]\!]H = \top$ iff $G = H \;\&\; G[\![\alpha_1]\!] \cap G[\![\alpha_2]\!] \neq \varnothing$
- $G[\![\alpha_1 \oslash \alpha_2]\!]H = \top$ iff $G = H \;\&\; G[\![\alpha_1]\!] \cap G[\![\alpha_2]\!] = \varnothing$

[7] DPlL is a partial logic. Given space considerations, I give only the conditions for truth, though there are also definedness conditions and conditions for falsehood. I adopt the definitions given in van den Berg (1996), except for distributivity, where I assume the modified definition of Nouwen (2003). The definition of subset ($\subseteq$) given above corresponds to *free subset*($\subseteq^F$) in van den Berg (1996, §4.2.3).

[8] I have added semantic definitions for overlap ($\bigcirc$) and non-overlap ($\oslash$).

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Stereotypes, Desires, and Constructions *

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Abstract

This paper develops a semantic analysis of the three constructions: (i) the subject-oriented adverb construction (*Wisely, John left early*), (ii) the 'Adj. + to Inf.' construction (*John was wise to leave early*), and (iii) the 'Adj. + of NP' construction (*It was wise of John to leave early*), which all involve three semantic components: (i) an individual a (*John*), (ii) a property P_1 that describes a mental/behavioral propensity (*wise*), and (iii) another property P_2 which typically describes an action (*leave early*). I argue that the three constructions share the meaning along the lines of: '$P_2(a)$, and P_2 is one of the properties that are expected to be true of any x such that $P_1(x)$', while they differ as to which component they assert/pressupose. I further demonstrate that this analysis allows us to solve two known semantic puzzles concerning these constructions, the "entailement puzzle" and the "embeddability puzzle".

1 Introduction

This paper develops a semantic analysis of the three constructions illustrated in (1), which, for convenience, I call the subject-oriented adverb construction (so-adv-cxn), the 'Adj. + to Inf.' construction (adj-to-inf-cxn), and the 'Adj. + of NP' construction (adj-of-np-cxn).

(1) a. Wisely, John left early. (so-adv-cxn)
b. John was wise to leave early. (adj-to-inf-cxn)
c. It was wise of John to leave early. (adj-of-np-cxn)

The adverb in a so-adv-cxn is called subject-oriented (Jackendoff 1972) because it appears to characterize the referent of the subject, rather than the event denoted by the main predicate (as in: *John walked gracefully* ≈ *John walked in a graceful manner*) or

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the proposition denoted by the sentence (as in: *Probably, John failed the exam* ≈ *It is probable that John failed the exam*).

As has been pointed out in previous studies, the three constructions are roughly synonymous (Wilkinson 1970, 1976, Jackendoff 1972, Tenny 2000).[1] The exact meaning of the three constructions, however, is harder to pin down than it may appear. In particular, there are two known semantic puzzles related to these constructions, which must be accounted for by any sensible analysis of them (Wilkinson 1970, 1976, Barker 2002). First, from (1a–c) it does not follow that John is a wise person (ENTAILMENT PUZZLE). Second, the adj-to-inf-cxn and adj-of-np-cxn cannot be embedded under a predicate of intention, desire, or command, while the so-adv-cxn seems not to be subject to this constraint (EMBEDDABILITY PUZZLE).

I propose that the meaning shared by (1a–c) is along the lines of: 'John left early, and leaving early is one of the properties that are expected to be true of any wise individual', and demonstrate that this analysis solves the two puzzles at once.

2 Semantic properties of the three constructions

2.1 Semantic similarities

Semantically, the three constructions have been said to be (roughly) equivalent (Wilkinson 1970:430, 1976:164–166, Jackendoff 1972:57, among others). They all involve (i) an individual a (*John* in (1)), (ii) a property P_1 that describes a characteristic of an individual (*wise*), and (iii) another property P_2 which typically describes an action (*leave early*) as semantic components. Also, they all force a peculiar "relativized" interpretation of P_1 (see below).

Some adverbs (adverbial forms) are ambiguous between the "subject-oriented" use and the "verb-oriented" use. Jackendoff (1972:49) notes, for example, (2a) is ambiguous between (3a) and (3b); when the adverb is fronted to precede the subject (as in (2b)), the subject-oriented interpretation is elicited.

(2) a. John cleverly dropped his cup of coffee.
b. Cleverly, John dropped his cup of coffee.

(3) a. It was clever of John to drop his cup of coffee.
b. The manner in which John dropped his coffee was clever.

Adjectives (adjectival bases) that can fill in the P_1 slot of the three constructions include those listed below, which describe a mental/behavioral propensity of a sentient individual.

[1] They differ as to which part of their meaning they assert/presuppose; see below.

(4) bold, brave, careful, careless, clever, clumsy, (in)considerate, crazy, cruel, foolish, impudent, (un)kind, mean, (im)polite, right, (un)wise, wicked, wrong, smart, stupid

There is another, smaller class of adjectives which can participate in the so-adv-cxn and adv-to-inf-cxn, but seemingly not the adv-of-np-cxn.

(5) (un)lucky, (un)fortunate

(6) a. Luckily, John passed the exam.
b. John was lucky to pass the exam.
c. ?*It was lucky of John to pass the exam.
cf. It was lucky for John to pass the exam.

Following Wilkinson (1970, 1976), I call the former type of adjectives the *W(ise)* class, and the latter type the *L(ucky)* class.

Roughly, we can make the following generalizations: (i) the adv-of-np-cxn selects for the W class (and nothing else) for its P_1 slot, and (ii) the adj-to-inf-cxn and adv-to-inf-cxn select for the W class and the L class (and nothing else) for their P_1 slot.[2]

2.2 The "relativized" interpretation of P_1

One intriguing issue about the three constructions is the fact that none of them entails $P_1(a)$. Regarding the adj-to-inf-cxn, Barker (2002) illustrates this point with the following examples:

(7) a. Feynman is stupid.
b. Feynman is stupid to dance like that.

> "In [(7a)], Feynman is habitually stupid, or disposed or likely to behave stupid. In [(7b)], Feynman's stupidity is limited to his participation in a

[2]There are some exceptions/irregularities, however. For one thing, adjectival bases like *silly* and *cowardly* do not have corresponding adverbs derived with *-ly*, or such forms are awkward and marginal (e.g., *∼??*sillily*). This is apparently due to a dissimilatory phonological constraint.

Also, as noted by Jackendoff (1972:57), the base *careful* is rarely used in the adj-of-np-cxn, although it appears to belong to the W class (the judgements in (i) are Jackendoff's).

(i) a. Carefully, John spilled the beans.
b. John was careful to spill the beans.
c. *It was careful of Jonn to spill the beans.

This is probably because the sequence *careful of* elicits the "transitive" interpretation (of *careful*) as in 'The beaver stayed in the water, because it was careful of predators' to the effect that the other interpretation where the same sequence is part of the adj-of-np-cxn is obscured.

There may be other exceptions. Undoubtedly, certain combinations (of bases and constructions) are more commonly used than others, and it is often difficult to tell whether a given combination is ungrammatical or merely disliked.

> specific dancing event. Certainly neither sentence entails the other: Feynman might very well be stupid to dance wildly, in which case [(7b)] is true, at the same time he is a Nobel laureate, in which case [(7a)] may very well be false." (Barker 2002:3)

The same remark applies to the so-adv-cxn and the adj-of-np-cxn too.

One may be tempted to solve this puzzle by resorting to the distinction of individual-level vs. stage-level properties. Stowell (1990), in this spirit, proposes that dispositional adjectives like *stupid* and *kind* are coerced to receive the stage-level interpretation when combined with an infinitival complement, although they typically refer to an individual-level property.

Stowell's analysis of the adj-to-inf-cxn, however, cannot be maintained; as effectively demonstrated by Kertz (2006), a number of diagnostics unanimously indicate that the adjective in the P_1 slot of the adj-to-inf-cxn is individual-level, rather than stage-level. For instance, a typical stage-level predicate, such as *eager*, allows both the generic reading and existential reading of a bare plural subject, while a typical individual-level predicate allows only the generic reading. The main adjective in an adj-to-inf-cxn shows the latter pattern.

(8) a. American consumers are smart. (∀/*∃)
b. American consumers are smart to buy foreign goods. (∀/*∃)
c. American consumers are eager to buy foreign goods. (∀/∃)

Also, stage-level predicates can be felicitously embedded under *see/hear* but not under *consider/find*. Individual-level predicates show the opposite pattern, and so do propensity adjectives with a *to*-infinitive.

(9) a. *We have all seen the senator smart (to avoid controversy).
b. We all consider the senator smart (to avoid controversy).
c. We have all seen the senator eager to avoid controversy.
d. *We all consider the senator eager to avoid controversy.

Most of the diagnostics taken up by Kertz (2006) are not applicable to the so-adv-cxn or the adj-of-np-cxn (for syntactic reasons); however, based on (i) the fact that the three constructions are intuitively synonymous, and (ii) the result of the test with a bare plural illustrated in (10), it seems reasonable to conclude that in these two constructions too, P_1 denotes an individual-level (rather than stage-level) property.

(10) a. Smartly, American consumers buy foreign goods. (∀/*∃)
b. It is smart of American consumers to buy foreign goods. (∀/*∃)

To give a solution to the entailment puzzle, thus, the three constructions need to be assigned a logical form that does not entail $P_1(a)$ in the first place.

3 Proposal

In this section, I put forth a semantic analysis of the three constructions, which gives a solution to the "entailment puzzle" mentioned above, as well as the "embeddability puzzle" to be explained below. Then, in the following section, I compare the proposed analysis with its major alternatives, including Barker's (2002).

3.1 Stereotypical associations between properties

As pointed out by Wilkinson (1970:432), the adj-to-inf-cxn and the adj-of-np-cxn cannot be embedded under a predicate of intention, command, or desire (see also Barker 2002:3,26).

(11) a. #Feynman intended [to be rude to be utterly honest].
b. #I wanted it to be stupid of Feynman to dance like a fool.
c. #Bob asked the man to be bold to dash into the cave.

(Barker 2002:3,29, Wilkinson 1970:432)

Embedding of a so-adv-cxn results in an awkward sentence, but this appears to be because of a syntactic, rather than semantic, reason.

(12) a. (?)Ken intended to nicely help out John.
b. (?)Ken wanted John to wisely make a formal apology.
c. (?)Ken asked John to boldly dash into the cave.

I propose that the meaning shared by the three constructions is along the lines of: '$P_2(a)$, and P_2 is one of the properties that are expected to be true of any x such that $P_1(x)$'. This analysis solves the entailment puzzle and the embeddability puzzle at once. $P_1(a)$ is not entailed, simply because it is not part (a conjunct) of the logical form. Also, under this analysis, the issue of unembeddability illustrated in (11) can be treated as a special case of the phenomenon illustrated in (13) and (14):

(13) a. Anyone who dances like a fool is expected to be stupid.
b. #I want anyone who dances like a fool to be expected to be stupid.

(cf.) I want anyone who dances like a fool to be punished.

(14) a. It is expected of anyone who dances like a fool to be stupid.
b. #I wanted it to be expected of anyone who dances like a fool to be stupid.
c. #I asked that it be expected of anyone who dances like a fool to be stupid.

(cf.) a. I want it to be illegal for anyone who dances like a fool to attend a party.
b. I asked that it be illegal for anyone who dances like a fool to attend a party.

Whether one's intention, desire, or command is fulfilled or not is contingent on the state of affairs in the actual world (in the future). On the other hand, whether two properties, P_1 and P_2, stand in the law-like relation of: 'P_2 is expected to be true of any x such that $P_1(x)$' is not affected by "the way things are". One cannot make this relation hold or not hold by manipulating worldly entities (or in other words, by manipulating the world parameter within the range of accessible worlds), and in this sense, the meaning of the three constructions is beyond one's intention, desire, or command.

The reader may have noticed that, although the truth of 'P_2 is expected to be true of any x such that $P_1(x)$' is not controllable in the sense discussed above, '$P_2(a)$, and P_2 is expected to be true of any x such that $P_1(x)$' is controllable (the first conjunct being controllable). This, indeed, explains the embeddability of the so-adv-cxn illustrated in (12). How come, then, the adj-to-inf-cxn and the adj-of-np-cxn cannot be embedded? Crucially, in these two constructions, $P_2(a)$ is presupposed, rather than asserted (see below). The presupposed meaning of a complement is not interpreted as (part of) the target of intention, desire, etc., as can be seen from the fact that (15a) may well be true when (15b) is false (see Heim 1992, Oshima 2006).

(15) a. Feynman wanted to manage to talk to Seinfeld.
b. Feynman wanted it to be difficult to talk to Seinfeld.

3.2 Logical formulation

The law-like relation of two properties discussed above can be formulated with an expectation operator ('It is expected that', 'It is in the normal course of events that'; Meyer and van der Hoek 1996, Shai et al. 2001). An expectation operator can be defined, as one possibility, as a variant of the necessity operator whose base is properly restricted to "stereotypical worlds" (Kratzer 1981), where nothing surprising happens.

(16) $[\![\Box_{\mathrm{E}}\phi]\!]^{\mathrm{w,g}} = 1$ iff for every stereotypical world w', $[\![\phi]\!]^{\mathrm{w',g}} = 1$.

An "expectation operator as a necessity operator", however, leads to an undesirable consequence when used in combination the above semantic analysis of the three constructions (see fn.3). For this reason, I adopt the following alternative.

(17) $[\![\mathrm{E}\phi]\!]^{\mathrm{w,g}} = 1$ iff $[\![\phi]\!]^{\mathrm{w',g}} = 1$, where w' is the stereotypical world that is closest to w.

where distance between worlds is defined as follows:

(18) For all worlds w, w', and w", w' is closer to w than w" is (i.e., the distance between w and w' < the distance between w and w") iff {p: w ∈ p and w" ∈ p} ⊂ {p: w ∈ p and w' ∈ p}.

The E operator shifts the world of evaluation to what Francez (1992) calls the "expected world", where everything happens according to expectation and which is similar to the actual world in all other respects. An expectation operator of this sort can be used to describe the meaning of certain natural language expressions, including and in particular 'but'; i.e., ϕ *but* ψ would translate as $[[\phi \wedge \psi] \wedge \mathrm{E}[\phi \rightarrow \neg\psi]]$.

With the E operator, the basic semantic format of the three constructions can be formulated as follows:

(19) $P_2(a) \wedge \mathrm{E}[\forall x[P_2(x) \rightarrow P_1(x)]]$

If we instantiate a, P_1, and P_2 with 'John', 'wise', and 'leave early', we obtain the following, which can be informally paraphrased as 'John left early, and in view of the normal course of events, whoever left early would be wise' or 'John left early, and typically early-leavers are wise'.[3]

(20) $\mathbf{leave\text{-}early}(\mathbf{john}) \wedge \mathrm{E}[\forall x[\mathbf{leave\text{-}early}(x) \rightarrow \mathbf{wise}(x)]]$

Notice that, under this analysis, a speaker who utters: 'John was wise to leave early' is not committed to the truth of 'John is (or was) wise'; he may well be aware that the actual world is full of surprising and unexpected events (e.g., an unwise person's leaving early). To refute this utterance, thus, one must either convince the utterer that as a matter of fact John did not leave early, or that early-leavers are not expected to be wise (because they miss the most fun part of the party, etc.). Notice also that a speaker who utters: 'John was wise to leave early' is not either committed to the statement that typically wise people leave early (wise people are expected to leave early); this point becomes clear when we take an example like: 'Brutus was cowardly to stab Caesar in the back' – it is sensible to infer from the fact that somebody stabbed Caesar from the back that the stabber is cowardly, but it is far from sensible to infer from the fact that somebody (say, a neighbor of yours) is cowardly that the coward stabbed Caesar in the back.

[3]The alternative formulation in (i) with the expectation-as-necessity operator leads to problematic results regarding sentence like (ii).

(i) $P_2(a) \wedge \Box_{\mathrm{E}}[\forall x[P_2(x) \rightarrow P_1(x)]]$

(ii) John was smart to bring an umbrella on June 1st, the day when it started pouring in the afternoon.

In the actual world, bringing an umbrella on June 1st turned out to be a smart act. We cannot, however, conclude from this that in all stereotypical worlds every person who brought an umbrella on June 1st was smart, because stereotypical worlds may include worlds where it did not rain on that day.

In those stereotypical worlds where it did not rain on June 1st, smart people would have *not* brought an umbrella – because of their smart decisions. Thus, the formulation in (i) would make sentence (ii) false in situations where it is intuitively true.

The formulation in (19) is exempt form this problem, as the E operator has the effect of excluding "irrelevant" stereotypical worlds from consideration.

As mentioned above, the adj-to-inf-cxn and adj-of-np-cxn presuppose, rather than assert, $P_2(a)$ (Wilkinson 1970, Barker 2002). This can be confirmed by standard diagnoses with negation, modal quantification, etc.

(21) a. John was wise to leave early.
b. John wasn't wise to leave early.
c. Perhaps John was wise to leave early.

(22) a. It was wise of John to leave early.
b. It wasn't wise of John to leave early.
c. Perhaps it was wise of John to leave early.

All sentences in (21) and (22) entail 'John left early'. The so-adv-cxn, in contrast, asserts $P_2(a)$ and presupposes 'P_1 is expected to be true of any x such that $P_2(x)$'.

(23) a. John wisely left early.
b. Perhaps, John wisely left early.

(23b) does not entail 'John left early', but it still conveys a positive evaluation on the act of 'leaving early' like (23a) does. By the same token, if a so-adv-cxn is embedded in the antecedent of a conditional, the entailment: 'P_2 is expected to be true of any x such that $P_1(x)$' survives.

(24) If John wisely had left early, he wouldn't have been stabbed.

The assertion and presupposition of a statement can be expressed in a single logical formula, using the connective called PREDITIONAL (a.k.a. PREJUNCTION, TRANSPLICATION; Blau 1985, Blamey 1986, Oshima 2006).[4]

(25) **preditional**
$[\![\langle\phi;\psi\rangle]\!]^{w,g}$ is defined iff $[\![\psi]\!]^{w,g} = 1$
If defined, $[\![\langle\phi;\psi\rangle]\!]^{w,g} = [\![\phi]\!]^{w,g}$
(In intuitive terms, ϕ = assertion, ψ = presupposition)

By way of illustration, the meaning of *John managed to escape*, which (roughly) asserts that John escaped and presupposes that it was difficult for John to escape, can be expressed as: $\langle$**escape**(**john**); **difficult-for**(**escape**, **john**)$\rangle$.

The logical forms of (21a), (22a), and (23a) can now be given as follows:

(26) a. (21a), (22a) $\mapsto$
$\langle$E[$\forall x$[**leave-early**(x) $\rightarrow$ **wise**(x)]]; **leave-early**(**john**)$\rangle$

[4]The preditional connective is a powerful tool, with which we can deal with various technical issues concerning presupposition, such as projection at the sub-sentential level and the "linking problem" concerning the presupposition of an existential statement (see Oshima 2006).

b. (23a) ↦
⟨**leave-early**(**john**); E[∀x[**leave-early**(x) → **wise**(x)]]⟩

4 Comparison with alternative analyses

In this section, I examine two major, previous analyses of the three constructions and point out their problems. In passing, I also point out that the adj-to-inf-cxn has a variant where the W/L adjective takes the comparative form, and discuss its implications.

4.1 Wilkinson's action/event-Based analysis

Wilkinson (1976:164ff) suggests that a W adjective and an L adjective are, when they participate in the three constructions under discussion (as well as some others), predicated of an action (event) and a proposition, respectively. If this line of analysis is accepted, the sentences in (27) can be paraphrased as: 'John left early, and John's action (act) of leaving early was wise', and (28) 'John passed the exam and this fact (the fact that John passed the exam) was lucky for John'.

(27) (= (1))
a. Wisely, John left early.
b. John was wise to leave early.
c. It was wise of John to leave early.

(28) (= (6))
a. Luckily, John passed the exam.
b. John was lucky to pass the exam.

W/L adjectives, as a matter of fact, can be predicated of actions (events)/facts (propositions).

(29) a. He is wise. / a wise man
b. John's leaving early was wise. / His act(ion) was wise. / a wise act(ion)

(30) a. He is lucky. / a lucky man
b. It was lucky (for me) that it rained. / This fact is lucky. / a lucky fact

Thus we may say that W adjectives are polysemous between a property of individuals and a property of events, and L adjectives between a property of individuals and a property of propositions (sets of worlds).

Although Wilkinson's analysis gives a straightforward solution to the entailment puzzle, it has some weaknesses, too. First, it is not clear how the ambiguity of some W adverbs (which was mentioned in Section 2.1) can be explained. (31), for example, is ambiguous;

one reading is roughly equivalent to: '{It was kind of John/John was kind} to help me out', and the other reading: 'John helped me out in a kind manner'.

(31) John kindly helped me out.

Suppose John is an employee of an electronic appliance store, whose main job is to help out customers. In this case, (31) may well be false on the first interpretation, but may well be true on the second. Now, on the second, "manner" interpretation, *kindly* is obviously predicated over an event – thus, as long as we adopt the standard ontological assumption that an action is a sort of event (Kamp and Reyle 1993:506, among others), there seems to be no way to represent the difference of the two readings.

Furthermore, the unembeddablity puzzle remains unexplained under Wilkinson's analysis. That is, given that actions (events) are worldly entities like individuals, the sentences in (32) are predicted to be acceptable.

(32) a. #Ken asked (them) that the repairman be careful to check all bolts.
b. #Ken wanted the repairman to be careful to check all bolts.

(cf.) a. Ken asked (them) that the repairman's act(ion) be careful.
b. Ken wanted the repairman's act(ion) to be careful.

4.2 Barker's metalinguistic analysis

Barker (2002) proposes an innovative analysis of the adj-to-inf-cxn and the adj-of-np-cxn, where W/L adjectives participating them are assigned a "metalinguistic" function. First, Barker observes two "modes of use" of vague gradable predicates (which subsume W/L adjectives): descriptive and metalinguistic. When the gradable adjective *tall*, for example, is used in the normal, descriptive mode, it conveys new information concerning the (actual) world (e.g., the height of a particular individual). When it is used in the metalinguistic mode, on the other hand, it informs the hearer of how to use the word *tall* appropriately, by providing the contextually relevant standard of tallness. The descriptive use is exemplified by (33), the metalinguistic use by (34):

(33) A: I am going to pick up Dr. Feynman at the airport. What does he look like?
B: Well, Feynman is tall.

(34) (**Situation**: Speakers A and B are at a party; Feynman stands a short distance away.)
A: What do you mean by "if you are tall"? What counts as "tall"?
B: Well, around here, Feynman is tall.

Building on the Kampo-Heimian dynamic framework, Barker argues that a descriptive use and a metalinguistic use of a vague predicate affect (update) different aspects of the

context.[5]

A descriptive use affects the common ground; (33B), for example, adds to the common ground the proposition that Feynman's maximal degree of height exceeds the contextually prevailing standard (say, 180 centimeters). A metalinguistic use, on the other hand, affects the standard of the relevant gradable adjective meaning (e.g. tallness), and thereby resolve or mitigate the vagueness of the adjective in question; (34B), which is uttered in a situation where both the speaker and the hearer can directly observe Feynman's height, does not expand the common ground at all, but only help the interlocutors determine "what counts as tall" (or, "how to use the word *tall* appropriately").

To implement the idea that the standards for vague concepts too are a component of the context, the context set (in the Stalnakerian sense) may be defined, among other possibilities,[6] as a set of tuples ("information states") ⟨w, g, d⟩ where w is a possible world, g is an assignment function, and d is a DELINEATION – a function that maps gradable predicate meanings to standards (degrees). Suppose, when the conversation (33) took place, the prevailing standard of (an adult male's) tallness was 180 centimeters – then, the utterance of speaker B has the effect of excluding from the context set those tuples whose world component w' is such that $[\![\textit{Feynman is at least 180 cm tall}]\!]^{w'} = 0$. In the situation where the conversation (34) took place, in contrast, Feynman's height is already in the common ground – if Feynman was exactly 182 cm tall, then all information states in the context set (before and after the conversation) have a world component w' such that $[\![\textit{Feynman is 182 cm tall}]\!]^{w'} = 1$. What the utterance of speaker B does is to exclude from the context set those tuples whose delineation component is inappropriate. If d' is such that d'($[\![\textit{tall}]\!]$) = 185 cm, then ⟨w', g', d'⟩, ⟨w", g', d'⟩, ⟨ w", g", d'⟩, etc. have to leave; if d" is such that d"($[\![\textit{tall}]\!]$) = 175 cm, then ⟨w', g', d"⟩, ⟨w", g', d"⟩, ⟨w", g", d"⟩, etc. will survive.

Regarding the adj-to-inf-cxn and the adj-of-np-cxn, Barker claims that in these constructions W/L adjectives are predicated of a proposition, and have only a metalinguistic mode of use.[7] The sentence: *Feynman is stupid to dance*, for example, has no regular, descriptive entailment (putting aside the presupposition that Feynman danced), and merely narrows down the range of possible delineations, so that only those delineations

[5]The analysis proposed in Section 3 may be easily given a dynamic formulation, if so wished. One may, for example, enrich a standard dynamic framework with a "second context set" that corresponds to stereotypical worlds (worlds that may be the expected world), in addition to the regular context set that corresponds to epistemically accessible worlds (worlds that may be the actual world). Statements as to how things should be in the normal course of events, such as (13a) and (14a), update the second context set, without affecting the first.

[6]In Barker's (2002) formalism, an assignment function and a delineation are treated as inhabitants of a world, and thus a context is defined simply as a set of worlds. This technical choice should not have any bearing on the discussion in the present paper.

[7]In Barker's (2002:25) formulation, a W/L adjective in an adj-to-inf-cxn or adj-of-np-cxn is treated as a three-place predicate, which takes a degree d, an individual a, and a property P as its arguments. He explains that **stupid**(d, a, P) holds iff a's participation in the event $P(a)$ has a degree of stupidity that exceeds d. From this explanation, it is not clear to me (i) why a and P, rather than just $P(a)$, must occur as separate arguments of **stupid**, and (ii) whether $P(a)$ should be understood as denoting a proposition or an event. If $P(a)$ is to be understood as an event, then Barker's analysis too is subject to the problems I pointed out in Section 4.1, in connection with Wilkinson's analysis.

according to which Feynman's dancing (the proposition that Feynman danced) counts as stupid will survive.

Barker's analysis of the adj-to-inf-cxn/adj-of-np-cxn is similar to the "stereotype"-based analysis proposed in the previous section, building on the idea that (some aspect of) their meaning is not about the way things are in the actual world. I find problematic, however, its basic assumption that all W/L adjectives can be semantically predicated of a proposition. While all L adjectives and some W adjectives can take a clausal complement, there are some W adjectives that cannot.

(35) a. It was lucky (for me) that John left early.
b. It was {wise/stupid} that John left early.
c. ?*It was {careful/careless} that John left early.

Furthermore, many W adjectives that can take a clausal complement require that the subject of the clausal complement be sentient, or at least that the event described by the clausal complement be a volitional action. This suggests that at the semantic level, these W adjectives may be predicated of an individual or a (certain kind of) event, but not of a proposition.

(36) a. ??It was {rude/brave/kind} that the portrait of the secretary-general was removed.
b. *It was {rude/brave/kind} that it rained.

The observation that W adjectives cannot modify a propositional noun like *fact* lends further support to this point.

(37) *a wise fact, *a careful fact, *a rude fact, *a brave fact, *a kind fact

4.3 A note on comparatives

The W or L adjective participating in an adj-to-inf-cxn may take the form of a comparative, as in:[8]

[8]The sentences in (38)–(40) were collected from the following sources:

(38a): www.menc.org/networks/genmus/openforum/messages/7083.html (April 14, 2007)

(38b): blogcritics.org/archives/2006/06/11/045028.php (April 14, 2007)

(39a): mail.python.org/pipermail/python-list/2003-May/207096.html (April 14, 2007)

(39b): home.earthlink.net/~nataku/misc/bloodstone.html (April 14, 2007)

(40a): Economic Change in Pre-Colonial Africa: Senegambia in the Era of the Slave Trade (a book review). *The International Journal of African Historical Studies*, Vol. 8, No. 4, 1975:724-726.

(40b): Richard Hofstadter's the Age of Reform: A Reconsideration. *Reviews in American History*, Vol. 13, No. 3, 1985:462-480.

(38) a. I was luckier than you to have access to a lot of materials.
b. [...] he was luckier than average to survive a couple of years before getting squished.

(39) a. It seems that one of your friends was smarter than you to get help [...]
b. He was probably smarter than we were to take advantage of the chance [...]

(40) a. [...] nobody was more careful than Curtin to emphasize that these were liable to substantial margins of error [...]
b. [...] he was more careful than Kolko to distinguish among different segments of the business community [...]

Adj-to-inf-cxn's with comparatives are a problem both for Barker's (2002) analysis and for the stereotype-based analysis, but for different reasons.

First let us consider their implication on Barker's analysis. As discussed by Barker himself, the truth of a comparative statement can be determined independently from the contextually established standard for the relevant adjective, and thus comparatives cannot have a metalinguistic mode of use. Thus, the fact that a comparative may fill in the P_1 slot of the adj-to-inf-cxn is in a clash with Barker's claim that W/L adjectives in these constructions are interpreted in the metalinguistic mode only.

Under the stereotype-based analysis, on the other hand, adj-of-cxn's with comparatives are assigned inadequate semantic representations; e.g., sentences (41a) and (41b) are given logical forms along the lines of (42a) and (42b), respectively.

(41) a. John was luckier than Fred to survive.
b. John was smarter than Fred to bring an umbrella.

(42) a. $\langle \mathrm{E}[\forall x[\mathbf{survive}(x) \rightarrow \mathbf{luckier}(x, \mathbf{fred})]]; \mathbf{survive}(\mathbf{john})\rangle$
(in prose: John survived, and in the normal course of events, anybody who survived is luckier than Fred.)
b. $\langle \mathrm{E}[\forall x[\mathbf{bring\text{-}an\text{-}umbrella}(x) \rightarrow \mathbf{smarter}(x, \mathbf{fred})]]; \mathbf{bring\text{-}an\text{-}umbrella}(\mathbf{john})\rangle$
(in prose: John brought an umbrella, and in the normal course of events, anybody who brought an umbrella is smarter than Fred.)

Quite clearly, (41a) entails that Fred did not survive, and (41a) entails that Fred did not bring an umbrella; the logical forms in (42), however, fail to capture this intuition. The intuitive meanings of (42a,b) appear to be something like:

(43) a. $\langle \mathrm{E}[\forall x[\textbf{survive}(x) \rightarrow \textbf{lucky}(x)]]; [\textbf{survive}(\textbf{john}) \wedge \neg\textbf{survive}(\textbf{fred})]\rangle$
(in prose: John was lucky to survive, but Fred was not.)
b. $\langle \mathrm{E}[\forall x[\textbf{bring-an-umbrella}(x) \rightarrow \textbf{smart}(x)]]; [\textbf{bring-an-umbrella}(\textbf{john}) \wedge \neg\textbf{bring-an-umbrella}(\textbf{fred})]\rangle$
(in prose: John was smart to bring an umbrella, but Fred was not.)

It is interesting to note that 'A is {luckier/smarter/...} than B to Inf.' entails 'A is {lucky/smart/...} to Inf.'. This makes a contrast with simple adjective constructions without a *to*-infinitive, which do not allow an inference of this pattern; i.e., 'A is {luckier/smarter/...} than B' does not entail 'A is {lucky/smart/...}' (unless it is contextually established that B is lucky, smart, etc.).

In sum, whether we adopt the metalinguistic analysis or the stereotype-based analysis, "adj-to-inf-cxn's with comparatives" as in (38)–(41) require a separate treatment.

5 Conclusion

This paper developed a semantic analysis of the three constructions called the subject-oriented adverb construction (*Wisely, John left early*), the 'Adj. + to Inf.' construction (*John was wise to leave early*), and the 'Adj. + of NP' construction (*It was wise of John to leave early*). It was proposed that the meaning shared by the three constructions is along the lines of: 'P_2 is true of a, and P_2 is a property expected to be true of any x of which P_1 is true' (where, for instance, P_1 = 'be wise', P_2 = 'leave early', and a = 'John'). It was further demonstrated that the proposed analysis solves two known semantic puzzles concerning the three constructions: (i) the entailment puzzle, and (ii) the embeddability puzzle (Wilkinson 1976, Barker 2002, among others).

The paradigm of the three constructions appear to constitute an ideal case for the Construction Grammar approach (Sag 2007), as their meanings cannot be derived from the intuitive meanings of their constituents and ordinary semantic rules alone. I leave it as a task for future research to formulate the proposed semantic analysis in the Construction Grammar framework.

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Not *Nearly* Synonymous.

Similarities and differences between *almost* and *nearly*[*]

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Abstract

In this paper we look at the difference in distribution and meaning between *almost* and *nearly*. *Nearly* has to do with expectations and is in general uneasy as a modifier of negative quantifiers, while it is grammatical in the scope of negation. On the other hand, *almost* is at best marginal in the scope of negation (unless an echo context is provided) and in combination with the NPI *any*. We propose that, when *nearly* is in the scope of negation, it loses its scalar component and its literal meaning of physical proximity can be accessed by negation and modified by it. This accounts for the particular interpretation of *nearly* under negation. To account for the contextual expectations raised by *nearly*, we suggest that the operator EVEN is instantiated by the presence of *nearly* and that EVEN does not interfere with the alternatives made salient by scalar operators like *almost* and *nearly* (contra Penka, 2005). We then propose an alternative explanation for the ungrammaticality of the combination between *almost*-NPI *any* and the acceptability of *nearly*-NPI *any*.

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1 Introduction

Most literature on *almost* builds on the intuition that two components are part of its meaning: following Nouwen (2006) and Horn (2002), we refer to them as the polar component and the proximal component. In the case of

(1) John's cat weighs almost 20 lbs.

the polar component signals that John's cat does not weigh 20 lbs., while the proximal component signals that John's cat's weight is close to 20 lbs. We will here summarize some of the most influential analyses that deal with these components and the issues they raise.

1.1 The polar component

With respect to the polar component, the main question is whether "the denial of the complement of *almost* is asserted, presupposed or conventionally or conversationally implicated" (Nouwen 2006).

Sadock (1981) argues for an analysis of the polar component of *almost* as a conversational implicature. According to Grice's Maxim of Quantity, given that a statement of the form *almost p* is weaker than *p*, the hearer assumes that the speaker believes *p* to be false in the actual world. The main support for an analysis of the polar component as a conversational implicature comes from two observations. As it is the case in classic cases of conversational implicature, the implicated material can be reinforced without redundancy. In the case of *almost*, thus, it can be seen from the naturalness of the phrase '*almost* but not quite all' that the polar component can be non-redundantly reinforced. Moreover, as is the case with many conversational implicatures, the implicated material is non-detachable; in the case of '*almost*' we can show that the polar component of *almost* is non-detachable given that it is triggered also by its synonymous *nearly*.

One problem faced by this proposal is, as pointed out by Nouwen (2006), that these two tests are neither necessary nor sufficient to demonstrate the existence of a conversational implicature. The main problem with the proposal is that the polar component cannot be easily cancelled (as is normally the case with conversational implicatures):

(2) ??John's cat weighs almost, in fact exactly, 20 lbs.

Rapp & von Stechow (1999) assume the polar component to be part of the conventional meaning of *almost*, while Penka (2005) prefers not to commit herself "regarding the status of the two conjuncts as presupposition, implicature or part of the truth conditions" (footnote 1, p.5). The main problem for an analysis that assumes the polar component as part of the semantics of *almost* is the grammaticality of sentences like the following:

(3) If you want to pass the exam, you have to answer almost all questions correctly.

In this case it is clear that somebody who answers all the questions correctly will pass the exam. It is hard to see how the polar component could be overridden in these cases, if it is indeed part of the semantics of the lexical item.

Nouwen (2006), however, notes that the polar component of *almost* is not very salient:

(4) Fortunately, almost all my friends attended my wedding

(5) Fortunately, not all my friends attended my wedding

In (4) it is clear that the adverb cannot modify the negative component, while it obligatorily does so in (5): "whereas we may infer from [(4)] that the speaker is pleased that most of his friends attended the wedding, [(5)] seems to suggest that she is pleased that some of them failed to turn up" (Nouwen, 2006:2). He then shows that the polar component of *almost* shares with presuppositions, conventional implicatures, and conversational implicatures the impossibility of being modified by a sentential adverb:

(6) Fortunately, John's son is 8 years old.
(Presupposition: John has a son)

(7) Fortunately, Jake, who by the way is a movie star, did not come.
(Conventional implicature: Jake is a movie star)

(8) Fortunately, some students attended the wedding
(Conversational implicature: Not all the students attended the wedding)

Given the difficulty in distinguishing between a presuppositional, a conventional, and a conversational implicature for the polar component of *almost*, Nouwen decides not commit

himself and only rejects the hypothesis of the polar component as part of the conventional meaning.

1.2 The proximal component

With respect to the proximal component, the obvious question to ask is what closeness to something means and on what scale this closeness is measured. Two main approaches exist in the literature: the intensional approach (Sadock 1981; Nouwen 2006), according to which closeness is measured in terms of distance between possible words, and the scalar approach (Penka, 2005) according to which closeness is measured in terms of ranking of focus alternatives.

1.2.1 The intension al approach

The original analysis of *almost* as an intensional operator dates back to Sadock (1981):

[almost] =λw. $\lambda p_{<st>}$. $\exists$ w' [w' is not very different from w & p (w')]

The problem with this formulation is that dissimilarity is not formally defined.

In Nouwen (2006), a world in which the proposition *almost p* is true identifies a world which is minimally distant from a world characterized by the truth of the proposition *p*. Minimal distance between two words is then formally defined as follows: "w_1 is n-removed from w_n if there exists a sequence $w_n, w_{n-1}, \ldots w_1$ such that such that for all n>i> 1, it holds that w_i is 1-removed from w_{i-1}" (Nouwen, 2006:5). The meaning of *almost* can then be captured by saying that "*almost p* is true if and only if *p* is true in some n-removed world, where ***n* is small**[1]" (ibid.)

The intensional theory argues that in the case of (9):

(9) John's cat weighs almost 20 lbs.

[1]Emphasis added.

a world (w) in which the proposition 'John's cat weighs 20 lbs.' is identified, and some contextually determined words in which 'John's cat weighs 20 lbs.' is false are present (e.g., there is another world 1-removed from w in which John's cat weighs 19.9 lbs., a world 2-removed from w in which she weighs 19.9 lbs. and so on). The *almost* component identifies the actual world as one that is n-removed from w, with n being a small number. This theory accounts for the ungrammaticality of examples like

(10) *Almost a/some student came.

(11) *Almost two students came.

The ungrammaticality of (10) stems from the impossibility of ordering between worlds. Given a world (w) in which some students came, it is not possible to order the contextually relevant worlds in which 'some student came' is false, given that they all are 1-removed from w. The ungrammaticality of (11) is explained by the fact that all worlds in which the proposition 'two students came' is false, *n* is small (they are either 1- or 2-removed), "consequently there is no bases for a measure of proximity" (Nouwen 2006:12, footnote 3).

As pointed out by Morzycki (2001), one problem that the intensional approach faces comes from, DP modification: it not clear in what respect the worlds in which p is true are allowed to vary with respect to the actual world. In the case of (12),

(12) Almost every plant is dry.

our intuition clearly says that such worlds should vary from the actual world with respect to the proportion of dry plants over the non-dry plants, and not with respect to the degree of dryness of each individual plant. But assuming an intensional approach, we need special restrictions to disallow this from happening. To disallow this kind of interpretation for DP modifier *almost*, two main solutions have been proposed. One (Penka 2005, see below) abandons the intensional view and treats *almost* as a scalar focus element (the focus component specifies the dimension along which the alternatives are allowed to differ from *p*), while Morzycki (2001) resorts to a special rule for DP-modifying *almost*, so that the worlds cannot vary with respect to the extension of the VP.
According to the proponents of the intensional approach, the latter framework is better suited to account for VP-modifying *almost*. In the case of

(13) Travis almost qualified for the long-jump final.

assuming that 6 meters are the minimum for qualification, *almost* picks out a world that is closer to a world in which Travis jumps 6 meters. Such a world (w') is one in which Travis jumps 5.9 meters and not one (w'') in which Travis jumps only 2 meters, given that more degrees would need to be added to Travis's jump in w''. It is important to notice that in all the cases above, *almost* modifies monotonic expressions. When *almost* combines with other types of expressions, it becomes difficult to order between different worlds. Nouwen (2006) offers the following example:

(14) It is almost 3 o'clock.

In this case, our intuition tells us that it can very well be 2:55, but clearly not 3:05. The problem is that the upper reading cannot be excluded, as we have done in all the other cases, by resorting to the polar component of *almost*, given that 3:05 is not 3 o'clock.[2] Nouwen (2006) suggests that we can say that 3:05 does contain 3 o'clock because time is ordered and hence for it to be 3:05 it needs to have been 3:00. Hence this reading is ruled out again by the polar component. Notice that this approach also takes care of the cases in which both the upwards directed and the downwards directed reading are possible given a suitable context: The sentence

(15) Today the temperature was very unlikely for the season: it was almost 15°C!

would be probably interpreted as meaning that it was about 12-14°C, if uttered during the winter, while it would be interpreted as meaning that it was about 16-18°C, if uttered during the summer. This is explained by making reference to a scale of ordered values whose direction can be reversed during the winter, given that we are used to lower temperatures, the scale starts from a temperature lower than 15°C, while the opposite is true for the summer. The polar component excludes temperatures that are higher than 15°C during the winter, because they include 15° given that 15°C need to be reached for the temperature to go higher, while the polar component excludes temperatures lower than

[2] In the case of (1), the upwards directed reading would have been 'John's cat is 21 lbs'. Given that 31 lbs. contain 30 lbs., and hence, in a sense, are 30 lbs., the polar component of *almost* excludes this reading.

15°C during the summer, given that 15°C would need to be reached for the temperature to drop to those values.

1.2.2 The scalar alternative approach

According to Penka (2005), *almost* is a scalar focus element, which presupposes the existence of alternatives ranked on a scale. These alternatives are ranked on a Horn scale (Horn, 2001), that is, elements on the scale are ordered so that an element in the scale entails all elements ranked lower. To avoid the problems pointed out by Morzycki (2001) with respect to DP modification, scalar ordering is projected along with focus alternatives, so that the alternatives taken into consideration are of the right type. In this framework, *almost* p is true if and only if p is false and there is a contextually relevant alternative to p (p'), which is close to p and true.

The ungrammaticality of (10) is easily explained in this approach: the only alternative to *p* (some student came) is p' (no student came). Because of its scalar component, *almost* requires the presence of more than one alternative. To explain the ungrammaticality of (11) Penka would probably have to say that more than n (n= small number) alternatives must be salient in the context. Notice that this is intuitively correct: there is nothing wrong in principle in the combination of almost and a number like 2, provided that a significant number of alternatives are possible in the context:

(16) John's dog weighed almost 2 lbs when he was born.

Given that measure phrases are associated with dense scales, a significant number of alternatives becomes available (1.7., 1.8, 1.9…) and the use of *almost* is then grammatical.
According to Nouwen (2006), this theory is well equipped to deal with DP-modifying *almost* (and maybe better equipped than the intensional approach, as we have seen with the problems raised by Morzycki), but it faces serious problems when it has to account for VP modifying *almost*. Alternatives to a given proposition are based on natural language expressions, so unless the predicate modified by *almost* is a degree predicate, it is hard to see what the alternative can be. In the case of (13), repeated here as (17)
(17) Travis almost qualified for the long-jump final

the only alternative to p 'qualify for the long-jump final' is 'not to qualify for the long-jump final' (given that the scalar approach crucially relies on scales of natural language expressions), but we have seen that *almost* needs more than one alternative to be successfully applied. Moreover, as argued by Nouwen, modifying the requirement that Horn scales work with natural language expressions so that contextual alternatives could be independent from the natural language expressions used in the proposition being evaluated still wouldn't give the desired results: "The reason is that the meaning of the example in [(13)] cannot be expressed in terms of the set denoted by the VP. The set of qualifiers is irrelevant to the truth of *Travis almost qualified.* The only thing that matters is Travis' efforts." (Nouwen 2006:6-7)

Penka (2005) finally discusses the incompatibility of *almost* with NPIs. In her opinion, this is due to an intervention effect (Linebarger 1980). Following Beck (2006), she proposes that *almost*, an element that evaluates among different alternatives, interferes with the evaluation of focus alternatives introduced by NPIs (Krifka (1995); Lahiri (1998)) and vice versa, so that these elements are mutually incompatible.

2 *Almost* and *Nearly*

As we have seen, *almost* has received considerable attention in the recent literature. However, its synonymous *nearly* has been overlooked and in the few cases in which it has been mentioned, it has been assimilated in meaning to *almost* (see Sadock, 1981). Dictionaries tend to interchange them freely:

Almost: all but; very nearly
Nearly: almost
(*The Concise Oxford Dictionary of the English Language,* 1990)

Almost: very nearly but not completely
Nearly: almost, but not quite or not completely
(*Longman Dictionary of Contemporary English,* 1995)

Almost: nearly but not quite
Nearly: almost or not completely
(*Cambridge International Dictionary of English, 1995*)

Almost: not quite; very nearly

Nearly: very close to; almost
(*The New Oxford Dictionary of English*, 1998)

"You use *almost* to indicate that something is not completely the case but is *nearly* the case. *Nearly* is used to indicate that something is not quite the case, or not completely the case."
(*Collins COBUILD English Dictionary for Advanced Learners,* 2001)

2.1 Frequency and distribution

By conducting a simple dictionary search, it would seem that the two items are completely interchangeable, and no dictionary mentions a difference in use or in nuance. If one looks at frequency, it seems that *almost* is much more frequent than its synonymous *nearly*. In the CobuildDirect Corpus *almost* is 2.33 more frequent then *nearly*. A simple-minded Google count gives the same result: *almost* is 2.27 times more frequent than *nearly*. Kjellmer (2003) provides the relative frequencies of these two items in the twelve subcorpora of the CobuildDirect Corpus.

These corpora include different text types: public radio (US and UK), newspapers (UK and Australia), fiction and non-fiction books (US and UK), ephemera (leaflets, adverts, both US and UK), magazines (UK) and transcribed informal speech (UK). From his analysis, it appears that "*almost* prefers literary styles of writing (US books, UK books, UK Times) and avoids more popular text types (*Sun* newspaper, UK and US ephemera, and informal speech), whereas *nearly* tends to be more used in the US news media, while neither of them is used much in spoken British English" (Kjellmer, 2003:21). Kiellmer also looked at the different frequency of *almost* and *nearly* with respect to syntactic category they modify. *Almost* is more frequent with adverbs[3] (the *almost*/*nearly* ratio is 7.39), adjectives[4] (7.49), pronouns (5.29) and prepositions (8.03). *Nearly* is followed by nouns as frequently as *almost* (1.42), while it is followed more frequently by numerals (0.7). He suggests that "*almost* is typically followed by manner adverbs (*obscurely, intentionally)*, time adverbs

[3]As noted by Wolf (1996) *almost* but not *nearly* can occur before adverbs in *–ly*

i) Without proper guidance, you will almost certainly run into difficulties.

Notice that some adverbs (*very, pretty, so*) display the opposite behavior, and can only be modified by *nearly*

ii) He very nearly died

iii) I came across a paragraph about a girl I'd pretty nearly forgotten.

[4]Wolf (1996) notices that *almost* but not *nearly* can be modified by *like*

iv) It made me feel almost like a hostess

(*always, immediately*) and sentence adverbs (*undoubtedly, certainly*), whereas *nearly* typically occurs in the construction *not* + *nearly* + *as*" (Kjellmer, 2003:26). In the sample sentences he reports (the first 23 sentences of the corpus containing *almost* and the first 23 containing *nearly*), it is interesting to note that *almost* is never preceded by negation, while in 10 of the 23 sentences with *nearly*, *nearly* is preceded by negation:

(18) […] distribution rights, though **not *nearly*** as many as they had hoped for
[…] black and white, and – and it's **not *nearly*** as polished as this
[…] immediate reaction would **not** be ***nearly*** as sympathetic
[…] combined German team **won't** be ***nearly*** as good as the East German team
[…] fail ridiculously. But I **don't** feel ***nearly*** as foolish as the time I bought the
[…] as an insider or an outsider is **not *nearly*** as important as proving to voters
[…] moves, which they say do **not** go ***nearly*** far enough, will be enough for
[…] to the ancient Egyptians, he **wasn't *nearly*** as important as an earlier king,
[…] the parties are **not *nearly*** as powerful as they once were, but
[…] US government is **not** spending ***nearly*** enough on industrial research and
[…] says the prosecutor did **not** go ***nearly*** far enough. She says all seven of
[…] to a strict budget which is **not *nearly*** as big as it was last year

This fact is very important and is also mentioned in Wolf (1996) and analyzed by Pozzan and Schweitzer (2007). The opposite behavior is found when these words modify negative expressions like *no*, *none*, *nobody*, *nothing* (Wolf 1996; Lieberman 2007) and free choice *any*.

Lieberman notes that, in Google's general index, *almost* is in general more common than *nearly*; nonetheless, "*with everyone, almost* is 30% commoner than *nearly*, but with *no one* it is 3.840% commoner". (Lieberman, Language Log, June 14th, 2007). Lieberman then compares *almost* and *nearly* when used as modifiers of *always* and *never* and finds that the ratio of *almost* to *nearly* is about 5 when these elements are preceded by *always*, but it becomes about 20 in the case of *never*. Similar ratios are found when comparing *almost* and *nearly* as modifiers of *none* of and *all of*: the ratio is around 38 in the first case and around 3 in the second case. Sure enough, *nearly* is found as a modifier negative quantifiers, but it is not nearly as frequent as *almost*.

2.2 Meaning and implicatures

Up to now we have examined the differences in frequency and distribution between *nearly* and *almost*. The obvious question to raise is whether these distributional differences can be explained by some difference in meaning or in presuppositional content. We have seen that most dictionaries define one word by using the other; in the Webster dictionary, for example, we find the following statement about the differences among about *nearly*, *almost*, approximately: "their differences in meaning are often imperceptible." But what about the cases in which they indeed are perceptible? What are these cases?

One difference that comes to mind when thinking about *nearly* and *almost* has to do with their literal meaning and etymology. *Almost* derives from old English *eallmæst*, which is a compound of *eal* "all" and *mæst* "most", while *nearly* clearly maintains to some extent the idea of physical proximity, and can be used to mean "closely" or "intimately". For this reason, (19) is fine while (20) is ungrammatical:

(19) The person most *nearly* concerned.

(20) *The person most *almost* concerned.

Ben van Heuvelen (as reported in Sadock, 2007) suggests that for this reason, even when used as degree modifiers, *nearly* maintains this spatial connotation:

> *Nearly* is a more concrete word than *almost*. Both adverbs are used as degree modifiers, but *nearly* entails a slight metaphor, since the adjective and preposition forms of the word (*near*) suggest physical proximity. It's impossible to use *nearly* without subtly invoking physical space. For example, my understanding of the sentence 'They were *nearly* happy' is informed by my previous understandings of sentences like 'You are near the supermarket.' (True, you can also use *almost* when talking about physical space – 'You are *almost* at the supermarket' – but to do so you have to add a preposition. There isn't a metaphor built into the word.). My theory is that we tend to rely on *almost* when the idea we're conveying is more abstract, something we can't easily picture. '*Nearly* everyone' is easy to picture (a big crowd), as are the '*nearly* worthless' things I encounter every day. '*Almost* no one' is *almost* impossible to picture (an empty space? a space filled with a couple

> semi-translucent bodies?), while an '*almost* priceless' object is a logical impossibility. In the latter two cases, we rely on the more abstract adverb, *almost*. (Language Log, June, 16th 2006)

In Wood's *Current English Usage* (1981), we find a similar observation. While *almost* is just a 'minus word' indicating the fact that some 'goal' is not reached, *nearly* "conveys the sense of approximation to the world it modifies." It would seem then that *nearly* focuses on the idea of approximation to a goal, while *almost* focuses on the result, which is the fact that some goal (positive or negative) has not been reached.

According to Evans' *Dictionary of Contemporary American Usage*, on the other hand, the intuition is more or less the opposite: "A book that is *almost* completed is nearer its completion than one that is *nearly* completed".

An important observation is again found in Wood's *Current English Usage* (1981): "The tendency seems to be to use *nearly* rather than *almost* when some special significance is implied. If someone asks us the time we might reply that it is either *almost* or *nearly* ten o'clock; but we should probably use *nearly* to the exclusion of *almost* if we wished to express **surprise**[5] at the fact, or if someone had asked us to tell him when it was ten. It is *almost* eight kilometers to the next village is a simple statement of distance. If we wish to suggest that it is **too far** to walk, or that it is **further than one would think**, then we are more likely to say that it is *nearly* eight kilometers. Similarly, 'It cost me *almost* twenty pounds' is a mere statement of price but 'It cost me *nearly* twenty pounds' suggests that it was **more than** might have been **supposed**, or more than I wished to pay."

A very similar idea is expressed by Sadock (2007); according to him, there is a difference in conventional implicature between these two items, which has to do with expectations: "*Nearly n* connotes that *n* exceeds (hence is better than) what was expected or hoped for, while *almost n* does not conventionally connote any particular desire, hope or expectation, but easily supports a conversational implicature to the same effect as the conventional implicature associated with *nearly*." Hence the two items are different in terms of what they convey about the speaker's expectations about a certain quantity that was not attained (polar component). According to Sadock, (21) is marginal while (22) is fine

[5]Emphasis added.

(21) ?I have *nearly* 10 dollars in my wallet. (uttered by an adult)

(22) Molly has *nearly* 10 dollars in her piggy bank.

This is so because, while in most contexts it is expected that an adult has 10 dollars in his wallet, this amount is, on the other hand, probably unexpected for a three year old. (21) would thus be an awkward sentence, given that the choice of *nearly* indicates that the quantity it modifies is more than expected, while, on the contrary, $10 is considered a reasonable amount for an adult to have in his wallet. Notice that in his account, crucially, *nearly* conveys the idea of something approximating to an *n* which "exceeds (hence is better than)" some other (expected) *n*. This allows him to account for the deviance of the examples in which *nearly* modifies a negative quantifier. Thus

(23) ? Nearly no one was there

is deviant because in most context it is unlikely that n=0 is more/better than expected for. But, by scale reversal, it is possible to find situations in which *nearly* modifies negative quantifiers. In the case in which n=0 and n is better than expected for, the combination of *nearly* and a negative quantifier becomes fully acceptable. According to Sadock, in fact, the following sentence is perfectly grammatical, given the assumptions that the speaker has organized a boycott on Humvees and that n= 0 exceeds expectations:

(24) Nearly no Humvees were sold last month.

With respect to Sadock's proposal, we would like to raise two questions. The first question we would like to ask is whether the conventional implicature brought by *nearly* has to do with *n* being a quantity that is necessarily **more** than what is expected for or rather if this quantity being just different from what was expected. We agree with Sadock on the fact that (24) is fine in the context provided but we would also like to suggest that the sentence is also acceptable in a different context, namely one in which we like Humvees and we know that they are big sellers. In this case *nearly* does not convey the fact that n=0 is a fortunate event, but only that it is an unexpected one.

We would like to argue that the reason *nearly* is in general dispreferred as a modifier of negative quantifiers has to do with the way scales work: in general we assume 0 as a starting point/default quantity and consider bigger numbers as goals/unexpected amounts. In general, then, *nearly* is not used with negative quantifiers because 0 is the default and not an unexpected amount. The direction of the scale can be flipped by managing expectations in the context, so that 0 is not the starting point but rather the end point of the scale. In this case, the combination of *nearly* and negative quantifiers becomes fully acceptable.

We conclude that *nearly n* conventionally implicates that *n* is an unexpected amount; the further implication that *n* is better than expected is due to the fact that by default scales go from smaller numbers to bigger ones and that in general more means better.

The second question we would like to ask is whether the implicature brought about by the presence of *nearly* conveys the unexpectedness of what is denoted by *n* or rather that of what is denoted by *nearly n* .The question seems hard to answer, given the fact that the two quantities need, by definition, to be close to each other. To test for this, we need to create two contexts, one in which *n* is an unexpected amount while close to *n* is an expected one and one in which *n* is an expected amount while close to *n* isn't. The idea would be that if *nearly* can be used in the second context, we can't maintain the conventional implicature proposed up to now, which crucially requires that *n* is unexpected.

Context 1 (n= unexpected, close to n= expected): Sandra is a good student and her tests and homework are always very good, but never error-free. She normally makes one or two mistakes. Her teachers know this and they don't expect her to get a perfect score in the final, but expect she will make few mistakes.
Expected result (for Sandra's final): 2 mistakes. Unexpected result: 0 mistakes.
Actual result: there are 2 mistakes in Sandra's final
Teacher 1: How did Sandra do in the final?
Teacher 2:

(25) ? She made nearly no mistakes.

Context 2 (n=expected, close to n= unexpected): Sandra is a straight-A student and her tests and homework are always error-free. The final was particularly easy and everybody

made very few mistakes. It was everybody's expectation that Sandra would get a perfect score. But she made 2 mistakes.
Expected result (for Sandra's final): 0 mistakes. Unexpected result: 2 mistakes.
Actual result: there are 2 mistakes in Sandra's final

(26) Sandra made nearly no mistakes.

It should be clear from the contexts provided above that Sadock's original claim that it is part of the conventional implicature of *nearly* to indicate only the unexpectedness of what it modifies cannot be maintained: it can also be the whole phrase (*nearly n*) which is regarded as unexpected. Our idea, which will be developed in the next section, is that it is indeed the whole phrase *nearly n* which is valued as unexpected/unlikely by a non overt operator: EVEN.

3 Not *Nearly* and Not *Almost*

One interesting difference between *nearly* and *almost* that has been overlooked in the literature is their interaction with negation. While *nearly* is perfectly acceptable in the presence of negation, *almost* is marginal, at best. By looking at Google's general index, one can easily see that when these words are preceded by negation the ratio *almost/nearly* is reversed: *not nearly* is 41 times commoner than *not almost*.

Almost preceded by negation seems acceptable only in echo contexts, that is, when an occurrence of *almost* is present in the preceding context. (27) is acceptable only as an explicit correction of something like (28).

(27) ? We did not gather almost 100 signatures.

(28) We should have gathered almost 100 signatures by now.

Moreover, while a sentence like (29) is completely grammatical, (30) is ungrammatical, unless presented, again, in an explicit correction context

(29) The food here is not nearly as good as it used to be.

(30) *The food here is not almost as good as it used to be.

One interesting thing to notice is that *almost* and *nearly*, when in the scope of negation, do not have the same interpretation. Compare the sentences:

(31) ? John does not have almost $100.

(32) John does not have nearly $100.

(27) and (31) are acceptable only in echo contexts. In such contexts, the intuition is that (27) and (31) are true if and only if the number of signatures/dollars is **different** from the number denoted by '*almost* 100'. We will assume here the semantics for *almost* proposed by Penka (2005), with the further assumption that the polar component is part of the conversational implicature and not part of the conventional meaning of the word.

[*almost* p] = λw. ∃ q [q ≈ p & q (w)] & conversational implicature: p = 0 in w

We agree with Penka that *almost* always needs to take wide scope with respect to a proposition, but, contrary to Penka, we assume that *almost* does not always take scope over negation. Rather, it does so only if it c-commands negation prior to LF (as in (33)). This is intuitively clear if one compares (31) with (33).

(33) John almost doesn't have $100.

If *almost* was to take scope over negation, (31) and (33) would have the same truth conditions, namely the ones for (33). But this is clearly not the case, since (33) means that John has either $100 or a little bit more than $100, while (31) says that he has an amount that is either less than 90 or ≥ 100. These two interpretations need to be kept distinct from each other.

(31) is an echo sentence, whose function is to negate the corresponding affirmative. We propose that in this case *almost* can only scope over p, while it cannot take wide scope with respect to negation. This gives us the correct interpretation for a sentence like (31), which is derived from negating of the affirmative one:

[John has almost $ 100] = = λw. ∃ q [q ≈ (John has $100) & q (w)]
& c.i.: John has $100 = 0

[John doesn't have *almost* $100] = λw. ¬∃ q [q ≈ p & q (w)]
& c.i.: John has $100 = 0

The conversational implicature survives negation, but can be cancelled by using prosody, as is the case with classic conversational implicatures:

(34) John saw some students. c.i.: John didn't see all the students

(35) John didn't see some students. c.i: John didn't see all the students

(36) John didn't see SOME students, he saw all of them!

(37) John has almost $100. c.i.: John doesn't have $100

(38) John doesn't have almost $100. c.i.: John doesn't have $100

(39) John doesn't have ALMOST $100, he has $100!

To sum up, we have seen that *almost* tends not to be felicitous in the scope of negation, unless in echo contexts, where *almost p* gets negated. In these contexts, a scope theory of *almost* (see Penka, 2005) does not give the correct results; *almost* needs to be in the scope of negation to give the correct truth conditions for a sentence like (31). We would like to suggest that a sentence like (31) is semantically and syntactically well formed. The reason why it is marginal seems due principally to pragmatics factors. It is hard to see when it would be appropriate to communicate that some quantity x is different from being close to some quantity y, unless close to y was previously established in the context to be relevant, which is exactly what happens in an echo context.
We now need to give an analysis of *nearly* that accounts not only for the fact that a sentence like (32) (repeated here as (40)) does not require an echo context but that it has a different interpretation from (31):

(40) John does not have nearly $100.

Notice that the interpretation for (40) (=32) cannot be the same that we have derived for (31). First of all, the conversational implicature doesn't seem detachable:

(41) ?? John doesn't have NEARLY $100, he has $100!

Secondly, the intuition is that for (40) to be true, John should have considerably less than $100, not just less than $90. We would like to suggest the proximity component that is part of the literal meaning of '*nearly*' can be accessed by negation (probably due to this, *nearly* in negative contexts is almost always prosodically marked). When *nearly* is used in this way, it loses its scalar component and combines with negation:

(42) John is not *nearly* 60 years old. → John is far (from) 60 years old.

One important fact we would like to come back to is the earlier claim (Sadock, 2006; Wood, 1981) that *nearly p* is different from *almost p* because it carries the implicature that *p* is an unexpected event. We would like to suggest that this is due to the covert presence of a scalar focus operator, EVEN, whose function is exactly that of evaluating the content of its complement as 'unlikely'(hence 'unexpected'). Following Karttunen & Peters (1979), we assume the semantics of EVEN to be that of an operator taking wide scope over the proposition it modifies:

[EVEN p]: Assertion: p =1;

Presupposition: ∃ q in Context [likelihood q > likelihood of p] ^ q = 1

The function of the operator EVEN is that of making salient the existence, in the context, of a set of alternatives to *p* (focus component) and evaluating the likelihood of these alternatives as greater than *p* (scalar component). We propose the representation of *nearly p* to be the following:

EVEN [nearly p]: Assertion: nearly p = 1;

Presupposition: ∃ q in C [likelihood q > likelihood of nearly *p*]

An important fact that is captured by this analysis is the possibility of *nearly p* (as opposed to only *p*) to be what is valued as unexpected. Notice that this is exactly what we suggested and could not derive by assuming Sadock's (2006) proposal.

With this analysis in mind, we would like to go back to Penka's discussion of the incompatibility of *almost* with the NPI anybody. Following Lahiri (1998), she assumes that the focus alternatives introduced by NPIs get evaluated by the operator EVEN, which takes wide scope over negation. Penka, following Beck (2006), proposes that the sentence

(43) *I didn't see almost any student.

is ungrammatical because of the intervention of an alternative-ranking element (*almost*) with an alternative-evaluating element (even) introduced the NPI. Intervention effects arise, according to Beck, when two operators (Op_1 and C) that evaluate alternatives are found in the following configuration:

(44) *[Op_1 . . . [≈ C [. . .XP_1 . . .]]]

Accordingly, in this configuration the alternatives introduced by XP_1 fail to be evaluated by Op_1 due to the intervening presence of C. The ungrammaticality of (43) is thus easily derived: in the case in which *almost* is found in the position of Op1, EVEN acts as an intervener and there are no alternatives left for *almost* to rank, and vice versa:

*[$even_D$ [≈D [not [$almost_C$ [≈ C [I saw [a student]$_F$]]]]]

*[$almost_C$ [≈C [$even_D$ [≈D [not [[I saw [a student]$_F$]]]]]

Notice that, quite surprisingly for any theory that assigns the same semantics to *almost* and *nearly*, the latter element is compatible with the NPI *any*:

(45) I didn't see nearly any student.

Penka's way to deal with the ungrammaticality of (43) is not compatible with our analysis of *nearly* so far. Remember that, to account for the difference in expectations raised by the two items, we have proposed that *nearly* crucially involves the presence of a covert EVEN operator. Thus, the representation for *nearly p* that we have proposed instantiates exactly the kind of double evaluation configuration that Penka wants to rule out.

We propose that there is nothing in principle that makes the two operators (*even* and *almost/nearly*) incompatible: *almost* and *nearly* make salient and rank a set of alternatives to *p* and evaluate one of them (q) as true. EVEN, on the other hand, evaluates the proposition *q* as 'less likely' than the other alternatives in the context.

How can we then account for the ungrammaticality of (43) and the grammaticality of (45)? Notice that, on independent grounds, we have already shown *almost* to be incompatible with negation unless an echo context is provided, while *nearly* has been shown to be compatible with it. (43) and (45) are indeed cases in which these elements are c-commanded by negation. Crucially, no echo context can be provided for (43), given that the affirmative counterpart of the NPI *any* is the existential quantifier *a* (Laka, 1990; Pregovac, 1994), which is well known not to be modifiable by *almost*, given that it represents the bottom of the quantifier scale:

(46) **Almost* a / some student passed the exam. (Penka, 2005)

To sum up, building on the previous observation that *not almost p* is only allowed in a context where a previous mention of *almost p* was made and that *almost* is incompatible with the existential quantifier (which is the incarnation of any in non downward entailing contexts), we were able to independently motivate the ungrammaticality of (43).

Finally, the grammaticality of (45) is explained in the following way: in negative sentences, *not* combines with *nearly* to yield far (from).

[EVEN [I saw not *nearly* a student] → I saw far from a student

The assertion component of EVEN evaluates the proposition (I saw far from a student) as true, while its presupposional component evaluates it as the least likely one of other true proposition in the context (hence, with respect to some other proposition in the context: 'I saw far from 100', 'I saw far from 50…'). In this case, thus, far from 1 can only mean 0.

5 Summary and conclusions

In this paper we have summarized and discussed the main proposals in the literature about the semantics of *almost*. We compared *almost* with its quasi-synonymous *nearly* and showed that these elements are different in terms of expectations and interaction with negative quantifiers, sentential negation and NPI-any. We proposed that *nearly* is always

associated with a focus scalar component like *even*, which evaluates the content of its complement as unlikely/unexpected. This proposal, although it accounts for the intuition that the two elements are associated with different expectations, forced us to abandon Penka's (2005) analysis of the incompatibility between *almost* and the NPI *any*. We then showed that such incompatibility can be motivated on independent grounds and follows straightforwardly from our observation that *almost*, when in the scope of negation, necessitates an echo context, and from the well known incompatibility of *almost* with existential quantifiers. Finally, we showed that *nearly* is felicitous in the scope of negation; we proposed that this is due to the availability of its literal meaning under negation. This in turn enabled us to explain the different interpretation between *not nearly p* and *not almost p* and the compatibility of *nearly* and the NPI-*any*.

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A Semantic Explication of *Information Status* and the Underspecification of the Recipients' Knowledge*

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Abstract

This article presents a survey of and an investigation into the notion of *information status*. Based on insights from DRT and presupposition theory a new variant of IS taxonomis is developed, considering issues such as accommodation and underspecification of text with regard to hearer knowledge.

1 Introduction

Compared to the often (and sometimes sloppily) used notion of *givenness*, *information status* is a more general concept. I will provide the reader with an overview on the most important aspects of this notion starting with Prince (1981, 1992). I will discuss what has become of Prince's key insights in the contemporary IS annotation literature and furthermore point out a number of unsolved problems relating to accommodation and textual underspecification. These problems can be tackled when considering various kinds of progress that have been achieved in presupposition theory and Discourse Representation Theory. Following my survey I propose an annotation scheme that integrates those findings. The annotation system is currently applied in a research project in the Stuttgart SFB 732.

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2 Approaches to Information Status

2.1 Prince (1981)

In her seminal paper, Ellen Prince (1981) proposes a classification system for referential expressions in text according to different degrees or ways of givenness and novelty. Prince draws on a number of earlier attempts from the literature to define what it means for an expression to be *given*. Prince's proposal basically distinguishes between three top-level categories: *new, inferrable* and *evoked*, as shown in figure 1.

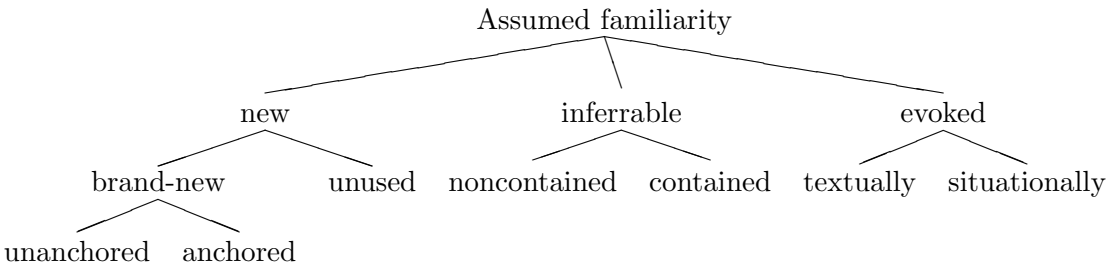


Figure 1: Familiarity taxonomy according to Prince (1981)

I need to emphasize that, although it looks as if we were dealing with a givenness continuum, it turns out that this is a question which is far more complex and should therefore not be answered prematurely. "Shared knowledge", as used in Clark and Haviland (1977), and defined as the speaker's assumptions about what the hearer knows, plays an important role in understanding most of the proposed categories.

Evoked

There are several reasons why the referent of an NP can be part of the shared knowledge. One is that it has been mentioned in the previous text, as (1), or it is available as part of the dialogue situation, which includes the discourse participants as well as individuals and objects to which they have visual, acoustic or some other form of direct access, like (2). Prince (1981) proposes the labels *textually/situationally evoked* to be assigned to the two types of NP uses.[1]

(1) Last week I had an argument with someone at the bus stop. The man was 1,90 m tall.

(2) *(pointing)* The girl with the bike is my niece Miriam.

[1]The expressions in question are marked by means of boxes, while the antecedent from which inferences are drawn is underlined.

Inferrable

An items whose referent is neither present in the discourse as yet nor in the situation but which is identifiable in the face of some other – already *evoked* – entity is called *inferrable*. An example is given in (3).

(3) George returned his laptop [to the dealer] because [the keyboard] was defective.

Although the "antecedent" of the *inferrable* item is typically present in the previous text it might also be situationally evoked, as in a case where the speaker points to a car while uttering (4).

(4) [The battery] is dead.

A group of constructions, of which possessives may be the most prominent, represents a special type of inferrables. They are characterized by their property of *containing* the entity (or set of entities) from which their referent can be inferred, as in (5). In other words, the antecedent of these *contained inferrables* is part of the expression itself rather than appearing elsewhere in the text or the environment.

(5) a. [one **of these eggs**]
b. [the door **of the Bastille**]

New

Finally, if an entity is neither *evoked* nor can be inferred from another available entity it is *new*. However, a distinction is made – and here, shared knowledge plays a role again – between those entities that the hearer knows from some earlier experience and those which he learns about for the first time. The former are called *unused* (example (6)), whereas the latter are referred to as *brand-new*, as in (7). *Brand-new* entities, especially indefinites as in (8), can however be *anchored* to some other entity.

(6) the sun

(7) a guy

(8) a. [a guy **I** work with]
b. [a friend **of mine**]

It is not entirely clear how to demarcate the uses where the referent of an expression should be said to be "*inferrable* from some *contained* entity" from those cases where the referent should be described as "*brand-new* and *anchored* within that entity".

2.2 Prince (1992)

A reorganisation of the categories is undertaken in Prince (1992). New is the emphasis on two dimensions of what is now called *information status*, viz. the status of the hearer and that of the discourse. However, not all categories from the previous proposal can be fitted into the scheme in table 1.

	Discourse-new	Discourse-old
Hearer-new	*brand-new*	–
Hearer-old	*unused*	*textually evoked*

Table 1: Information Status dimensions from Prince (1992)

Some remarks about table 1 are in order. First, as Prince remarks, the two dimensions are not independent of each other. If an entity is *discourse-old*, it is also necessarily *hearer-old*, hence the empty right upper area. Second, a classification as in the above table, can also be unfolded into a givenness hierarchy as in table (9).

(9) HN/DN *(brand-new)* < HO/DN *(unused)* < HO/DO *(textually evoked)*

Third, it is apparent that neither *situationally evoked* items nor *inferrables* can be sufficiently described by means of these two dimensions. As we can also not subsume them under any of the above categories we end up having five main classes.

2.3 Nissim et al. (2004)

In Nissim et al. (2004), an attempt is made, on the one hand, to provide finer distinctions (e.g. whether an *evoked* entity is expressed by means of a pronoun or else) on the other hand to further integrate the zoo of information status categories. One of their main intentions is to arrive at more consistent annotations by bringing down the number of top-level categories to three again.

Their newly introduced category *mediated* subsumes Prince's categories *unused*, *inferrable* and also *situationally evoked*.[2] A translation guide is provided in table 2.

2.4 Götze et al. (2007)

In the "Potsdam guidelines" (Götze et al., 2007), an elaborate annotation system for information structure is presented, one part of which is also concerned with *information status*. Like in Nissim et al. (2004) a three-way classification is employed, however Götze et al. (2007) use a different terminology: *old/textually evoked* is now simply called

[2]It should be pointed out that Nissim et al. (2004, p. 1023) contains two severe misrepresentations: *mediated* does **not** as it is claimed in a footnote "[correspond] to Prince's (1981; 1992) *inferrables*" and it is also not true that "generally known entities [...] such as 'the sun', or 'the Pope" can normally be said to be *inferrable* "from the previous conversation".

Nissim et al. (2004)	Prince	explanation
new	brandnew-unanchored (HN/DN)	
mediated-poss	brandnew-anchored/ inferrable-containing	possessee in possessive NP
mediated-part/ -situation/-event/-set	inferrable-noncontaining	"bridging"
mediated-general	unused (HO/DN)	
old-general	(a subset of) situationally evoked	discourse participants
old-* (several types)	textually evoked (HO/DO)	

Table 2: Comparison of Nissim et al. (2004) and Prince (1981, 1992)

given and in close (but not identical) correspondence to *mediated*, they postulate a category *accessible*[3]. By using less subcategories the classification of Götze et al. (2007) suggests itself to be easily applicable. However, providing too few categories may on the other hand carry the risk of annotators being forced into unintuitive decisions and the annotations are in danger of becoming less meaningful than they could have been otherwise. These are certainly important issues to consider though I won't have anything really substantial to say about them here and the current paper is not meant to provide an empirical investigation into the subject of inter-annotator agreement. The relation between the "Potsdam system" and Prince's original proposal is shown in table 3.

Götze et al. (2007)	Prince
new	brandnew-unanchored (HN/DN)
accessible-situation	situationally evoked
accessible-inferrable	inferrable-noncontaining
accessible-general	unused (HO/DN)
given	textually evoked (HO/DO)

Table 3: Comparison of Götze et al. (2007) and Prince (1981, 1992)

2.5 On the appropriateness of information status taxonomies

After having presented a number of different taxonomies it is certainly appropriate to pose the question according to what criteria one should decide between them. There are several arguments that come to mind. First, as I already remarked, practical considerations such as clarity, coverage and the possibility of obtaining a high agreement among annotators is certainly an issue. Second, the choice of a certain classification may obtain independent support if some or all proposed categories possess their characteristic reflexes in syntax (such as a strong tendency of occupying a certain position in word order with respect to other categories) or prosody (like a characteristic pitch accent selection or a specific fine-grained acoustic profile). A lot of research is currently

[3]from Chafe (1994)

being done on these topics. Third, cross-linguistic applicability is yet another factor: is our classification motivated by specific structures of a particular language or is it a general purpose tool that can be used for annotations in any language? And fourth, what can semantic theory tell us about the preference of one system over another? Are there semantic objects that have been proposed elsewhere in the literature that can be brought in accordance with information status categories? It is this fourth group of questions that we shall deal with in the remaining parts of this paper.

In the present section we shall have a look at different kinds of definite descriptions in order to demonstrate how the annotation systems I have mentioned differ with regard to their category assignments and to point out phenomena for which none of them suggests a satisfactory treatment. Let's first have a look at definites with a "familiar" referent as in (10) and assume that they occurred in a text for the first time.

(10) a. the Pope
b. the moon

The classification systems (abbreviations) introduced above would, as expected, assign these items the following labels.

(11) P: unused (HO/DN)
N04: mediated-general
G07: accessible-general

I take it that proper names should be treated as one kind of definite NP and certainly almost on a par with those in (10). This is a position which is not animously agreed upon. Kripke (1972), for instance, defends the view that names, other than definite descriptions, are rigid designators. I shall, however, follow Geurts (1997, p. 320), who claims that "[...]names must be expected to be used and interpreted like other definite NPs." Examples like those in (12) show that sometimes the distinction between what is "a name" or what is simply "used as a name" is impossible to draw.

(12) a. the Netherlands
b. the Tower of London
c. the Holy Spirit

Hence, what follows is that also a familiar name as in (13) should obtain the same tags that occur in (11).

(13) Johnny Depp

This, however, is not as straightforward as one might expect and although nothing contrary is claimed explicitly in the abovementioned literature, examples like (13) are likely to trick annotators into a confusion of form and function. We can see the problem

more clearly if we compare (13) to names like in (14), again assumed to occur in the given discourse or text for the first time.

(14) [John] loves [Mary].

"John" and "Mary" are *unfamiliar* in the sense that they do not refer to persons in our world knowledge (which is very common in typical examples from the semantics literature), hence they would receive the labels below.

(15) P: brandnew-unanchored (HN/DN)
N04: new
G07: new

In other words, "John" and "Mary" will receive the same information status as the *unanchored* indefinites in (16).

(16) [A man] loves [a woman].

In general, there is nothing wrong with an approach like that. After all, very much in the spirit of Ellen Prince's early conception, *information status* is to be kept separate from the formal feature *definite/indefinite*. Yet, it is also well-known that the story about the *novelty* of indefinites (since e.g. Heim (1982)) has been told in a completely different way than the story about the occasional *novelty* of definites as in (14), treated under the phenomenon of *accommodation* (Lewis, 1979, van der Sandt, 1992, Beaver and Zeevat, 2007). Note that an analogous confusion pertains to the notions *inferrable* and maybe also *textually evoked/old/given* (which I shall henceforth call *discourse-given* or – in short –*d-given*).

(17) a. Fred went to a pub late last night. When he arrived [the door] was closed.
b. John walked past the museum. [A painting] had just been stolen.

(18) a. Yesterday, I met my dentist. [The poor chap] just got divorced.
b. Agatha exhibited perfect manners, exactly as one would have expected it from [a lady].

Both *inferrables* as in (17) and *d-given* items as in (18) may occur with either *definite* or *indefinite* marking, an insight which, at first, might be much more puzzling than the by now well-established facts about definites conveying new information. The findings clash with the traditional picture from the dynamic and discourse-semantic literature (*indefinites* introduce "new" discourse referents, while *definites* pick up "given" ones, which is of course true for the prototypical cases.) The examples from (14) to (18), however, demonstrate why it is wise to keep the distinctions *given/new* (or similar) and *definite/indefinite* separate from each other.

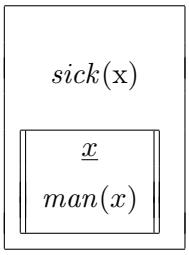
On the other hand, practice also shows that when annotating information status it is helpful to keep two separate sets of labels for either definite or indefinite expressions. Not only does this reduce the error rate of the annotators, it also enables faster access to potentially interesting data. For instance, empirical investigations into the specific syntactic or phonetic properties of information status categories should not only be carried out with regard to *new, inferrable* or *d-given* but one should also take into account more fine-grained classes by distinguishing between *new definites, new indefinites, inferrable definites, inferrable indefinites* and so forth. Such a classification system will be introduced below, but before we do that we shall consider some insights from DRT and presupposition theory.

3 Semantic background: definites, presuppositions & DRT

A well-known approach to the treatment of definite NPs in Discourse Representation Theory (Kamp, 1981, Kamp and Reyle, 1993) is the one in van der Sandt (1992). Definite descriptions, as the prototypical presupposition triggers, are represented as so-called embedded presuppositions (or "A-structures"), which I indicate by means of specially marked boxes. The sentence in (19) generates the *preliminiary DRS* in (20).[4]

(19) The man is sick.

(20)



It is a wide-spread and fairly uncontroversial assumption that presuppositions want to be *bound* to an antecedent, although some of them fail to do so. As discussed in van der Sandt (1992), in some cases where binding fails the referent of the presupposition may get *accommodated* (for instance) in the main DRS.

A more controversial claim is van der Sandt's frequently quoted dictum that *presuppositions* are *anaphors*.[5] Geurts (1999, p. 83) has criticised this claim for its "[inflating] the traditional concept of anaphora beyond recognition". The view which Geurts (1999) defends is rather that **some** presuppositions end up being anaphoric, while others do not. On the other hand, everything which is anaphoric may be represented by means

[4] I shall adopt the convention from Geurts (1999) as well as Kamp's current work to underline the "anaphoric" referent of an embedded presupposition, in order to distinguish it from other, existential discourse referents. More on the problematic notion "anaphoric" below.

[5] Actually, in van der Sandt (1992) it is claimed that presuppositions form a **subset** of the set of anaphors ($P \subset A$) and that pronouns, though anaphoric, aren't presuppositions. This has no influence on what I have to say here. For a longer discussion on these matters see Riester (2008).

of embedded presuppositions ($A \subset P$), including pronouns. One class of presupposition triggers that cannot be called anaphoric are certainly those which get accommodated and, hence, by definition do not have an antecedent.

But even for some of those definite descriptions that end up getting *bound* it is not clear whether we should necessarily call them *anaphoric*. The most prominent examples are those already discussed in (10), repeated in (21) (primary occurrences).

(21) a. the Pope
b. the moon

As is indicated in Geurts (1999), such definite descriptions are *bound* in the hearer's world knowledge. This claim is of course similar as the one from the literature on *information status* that these entities be identifiable on the basis of general knowledge. The choice is now whether to extend the meaning of *anaphoricity* from *being bound in the discourse context* to *being identifiable* or to remain more conservative and translate *anaphoric* as exclusively *discourse given*, while using *bound* in the general case. At the moment, I am undecided on this point, as I see advantages in both options.

3.1 Context Theory

The question of binding in contexts other than the actual discourse leads to a second one: which and how many different "contexts" do we have to assume? A recent paper by Kamp (ms.) addresses exactly this question. Kamp draws our attention to the fact that beyond the discourse context, which in the DRT literature has played an almost exclusive role, there are a number of other contexts that need to be taken into account as information sources in which expressions find their referents. The sum of these contexts is referred to as the "articulated context" and consists of the 4-tuple given in (22).

(22) $\langle K_{dis}, K_{env}, K_{gen}, K_{enc} \rangle$

As expected, K_{dis} is the familiar dynamic discourse context, representing a "protocol" of the previous spoken or written conversation.[6]

There is, furthermore, the *environment context* comprising all elements in the immediate dialogue situation. These are the elements that are typically, though not exclusively, picked up by means of demonstratives.

Next, there are two contexts containig the "shared assumptions" of speaker and addressee. The reason for having two contexts is that they differ with regard to the type of knowledge they contain. K_{gen}, the *generic context component*, contains conditional

[6]In Kamp's setup, K_{dis} subsumes part of the *utterance context*, K_{utt}, in the sense of Kaplan (1989) (that part which consists of speaker, addressee and utterance time). On Kaplan's own account these are treated as forming one context together with Kamp's *environment*. However, as Kamp argues, there is a clear distinction between the former entities and the environment context in that the former are always available, while the latter is not, for instance not in telephone conversations or in writing.

information describing, for instance, causal relations between events and other entities. As we are primarily interested in individual type entities, we shall not be concerned with this context component.

More relevant for the present paper, however, is K_{enc}, the *encyclopaedic context component*, which consists of the entities that the speaker may assume his addressee to have knowledge about.

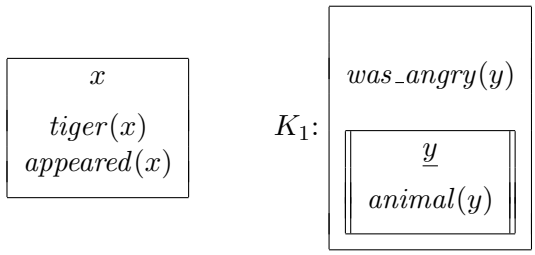
3.2 Binding in different context components

The advantage of a complex "articulated context" is that we need not worry about spelling out the semantics of different types of definite descriptions in the semantics but in fact may stick to one simple and general representation as e.g. the one in (20) above. The only thing that is needed in addition is an external resolution mechanism that guides an embedded presupposition through the different contexts in search of an antecedent. Due to space limitations, I shall only compare the resolution of definites in two different context components, viz. in the discourse context (example (23)-(25)) and in the encyclopaedic context (example (26)-(28)).

(23) a. A tiger appeared.
b. [The animal] was angry.

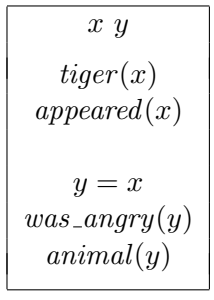
Assume that sentence (23b), represented as the preliminary DRS K_1 in (24), is uttered in the discourse context K_{dis_1}, made up of the content of sentence (23a).

(24)



As is standard procedure in contemporary DRT, first the embedded presupposition of K_1 is resolved in K_{dis_1} and then the resulting representations are merged, yielding the DRS K'_{dis_1} depicted in (25).

(25)

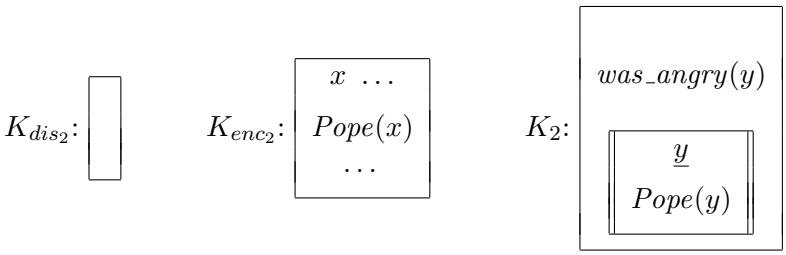


Now compare this to the processing of sentence (26) (K_2 in (27)) in an empty discourse context K_{dis_2}.

(26) [The Pope] was angry.

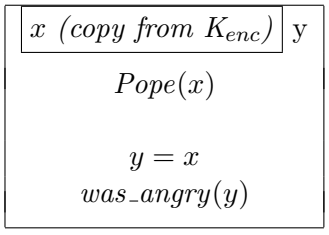
Since the embedded presupposition of K_2 cannot be resolved in K_{dis_2}, the encyclopaedic context component K_{enc_2} is consulted instead. Actually, the form in which I have depicted K_{enc_2} in (27) is necessarily a tremendous simplification. As the word "encyclopaedic" suggests, this context component is supposed to contain the entire set of individual entities the hearer has knowledge about, in combination with all sorts of information related to these entities. It is evident that in a paper presentation such a resource can only be displayed partially.

(27)



As soon as a referent for the embedded presupposition in K_2 is found in K_{enc_2} this referent (x) is copied (along with its associated property of being Pope) into the discourse context. I shall call this copying process *activation*. Finally, the discourse referent y from K_2 is linked to x and the DRSs are merged, the result of which is shown in (28).

(28)



3.3 Accommodation

Note that although from the perspective of the discourse context the process described in (27)-(28) looks like a case of *accommodation* it is actually a different matter. As I already mentioned in section 2.5, Geurts (1999) describes it as a type of *binding*. An instance of an NP that is likely to get accommodated is the one in (29).[7]

[7]The indigenous population in the German Southwest is rather fanatic in their habit of scrubbing the communal areas in and in front of their houses on a weekly basis. Nevertheless, an association as in (29) has not been heard of. I take it, though, that a cooperative dialogue partner, at least one having lived there, would not hesitate to accommodate its existence upon hearing (29).

(29) [The chairman of the Stuttgart street sweeping association] fell ill.

In the case of (29) there is no context component that might possibly contain a referent for the subject NP, hence nothing can be copied into the discourse context and a discourse referent must be newly created.

4 A new classification

It should by now have become easy to anticipate what the enterprise of the current article is meant to be. The central claim that I would like to make is the one below.

> **Claim: from a semantic point of view, Information Status categories should reflect the context components in which the presuppositions triggered by referential expressions are bound.**

Two things have to be added at this point: (i) for cases as in (29), a separate category label should be introduced to capture the cases of unbound or "to-be-accommodated" expressions. Since the only information that a hearer has about such entities consists in the description itself, I propose the name *accessible-via-description* for this category. (ii) What is intuitively missing in Kamp's concept of the *articulated context* but what is needed to cover the whole variety of definite NPs are smaller scenario contexts which serve as the referent supply in *bridging* cases.[8] In the case of (3), repeated here as (30) the scenario would consist of the set of things commonly associated with laptops.

(30) George returned his laptop [to the dealer] because [the keyboard] was defective.

The proposed classification for definite NPs is the one in table 4.

binding context	definite
K_{dis}	d-given
K_{env}	situative
K_{enc}	accessible-general/ encyclopaedic
$K_{scenario}$	bridging
none	accessible-via-description/ accommodation

Table 4: Proposed Information status classification for definite NPs

As for the indefinite domain, I propose to use the labels *new* for hearer-new/discourse-new indefinite expressions, and *partitive* for indefinite inferrables, like the one in (17b). I must add, though, that there are some further cases of "anaphoric", "specific" or otherwise "non-novel" indefinites (cf. Krifka (2001), Portner and Yabushita (2001), Geurts

[8] Kamp (ms.) doesn't need such scenario contexts but uses so-called context predicates to capture the meaning of bridging NPs. His approach deviates from the one proposed here, cf. Riester (2008).

(2002)) whose exact classification in accordance with the scheme proposed here still has to wait.

5 Underspecified knowledge

As the last point of discussion consider the follwing expression taken from a corpus of German radio news.

(31) der EU-Außenbeauftrage Solana
the Representative for the Common Foreign Policy of the EU, Solana

The question whether this item should receive the label *accessible-general* or *accessible-via-description* will crucially depend on the knowledge of the addressee. Radio and other news are typically addressed at a rather inhomogeneous audience. While person A may be fully aware of Mr. Solana and the position he is currently in, person B may have just been familiar with the name, while person C may not have heard of Solana at all. What this means is that different people will need different amounts of accommodation when processing the phrase in (31).[9] It would be impossible and quite unfortunate to demand of annotators in such cases that they decide between one or the other label. The option that is pursued in the Stuttgart SFB corpus annotations at present is to assign ambiguous labels together with a little flag to indicate which option is the most likely one. An sample annotation using the SALTO tool (Burchardt et al., 2006) is shown in figure 2.

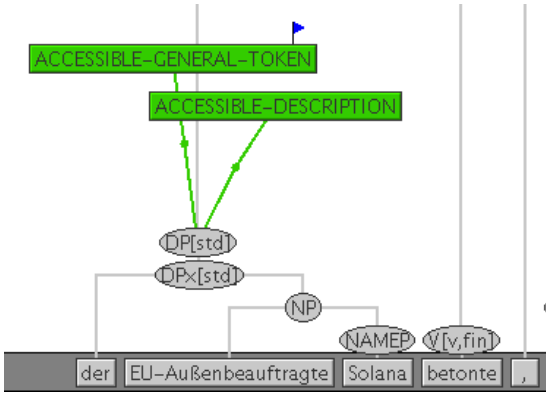


Figure 2: Ambiguous annotation of information status

[9]Kamp and Rossdeutscher (1994) use the notion *presupposition justification* for such hybrid cases between binding and accommodation.

6 Summary and outlook

In the present article I have discussed the notion of *information status* and different proposals as to how it should be annotated, including my own, which is fundamentally motivated by considerations based on DRT and presupposition theory. Developing a feasible annotation system is a prerequiste for creating resources for the investigation of prosodic and word order phenomena, which clearly depend on the concept of information status. My last remarks on the variation in knowledge among the intended recipients of certain text types (such as newspaper articles or radio news bulletins) and the underspecification of the encyclopaedic context for texts of this type that is entailed by this variation, however, should have made the reader alert that information status cannot always be unambiguously determined on the basis of the text alone.

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Hardts Surprising Sloppy Readings: A Flat Binding Account *

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Abstract

The paper presents an additional argument for a specific account of semantic binding: the flat-binding analysis. The argument is based on observations concerning sloppy interpretations in verb phrase ellipsis when the binder is not the subject of the elided VP. In one such case, it is important that one of the binders belong to the domain of the other. This case can be derived from the flat-binding analysis as is shown in the paper, while it is unclear how to account for it within other analyses of semantic binding.

1 Introduction

In a recent paper, I introduced a new account of semantic binding (Sauerland, 2007b). The purpose of this paper is to develop an additional argument in favor of the account. The argument is based on an investigation of cases of binding into elided structures extending observations by Takahashi and Fox (2005) and Hardt (2006).

Semantic binding is one of the central concepts of linguistic semantics. But since the mechanisms underlying semantic binding are rarely discussed, it is useful to recapitulate some basic properties of the concept. One core case of the phenomenon is binding of a pronoun by a quantificational expression in the same clause as in *Every boy likes his own father*. When applied to this sentence, the mechanism that establishes semantic binding has to ensure that, if John, Bill, and Harry are the relevant boys, John likes John's father Bill likes Bill's father, and Harry likes Harry's father. To ensure that the subject and the possessor position co-vary, any account of binding must involve a mechanism of storage and retrieval. Furthermore, the mechanism must have the capacity to store and retrieve more than one item since binding dependencies can overlap as in *Every boy*

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Grønn, Atle (ed.): *Proceedings of SuB12*, Oslo: ILOS 2008 (ISBN 978-82-92800-00-3), 523–536.

told his mother that he likes her. The core distinction between the standard logic-based accounts binding and the flat-binding account I advocate concerns the nature of this storage and retrieval mechanism: standard accounts are position-based – the memory is organized in a sequence of positions and access to memory is always by reference to specific position. In the flat-binding model, however, memory is not structured into positions and retrieval of a particular kind of item from memory is only possible by making use to an inherent property uniquely identifying the item. The two accounts assume the different logical form representations illustrated in (1) for the example already discussed above, where I assume a version close to Heim's and Kratzer's (1998) textbook of the position-based account.[1] In particular, where the position-based account makes reference to specific positions of the memory structure assumed (i.e. the assignment sequence), the flat binding account employs definite descriptions to uniquely identify a referent in memory.

(1) Every boy likes his own father.
   a. *Position-based:* Every boy $\lambda 1$ t_1 likes hi_1's own father.
   b. *Flat binding:* Every boy: the boy likes the boy's own father.

This paper develops a new prediction the flat binding account makes. The prediction concerns the interaction of ellipsis and pronominal anaphora. I call the phenomenon *Pseudo-Sloppy Readings*. These are similar to sloppy readings that are available in many cases of ellipsis. This prediction, which I explicate in detail in section 3 below. These are distinct from true sloppy readings as in *The boy likes his father and the man does too*. True sloppy readings on the flat binding analysis are derived on the basis of representations like (2) where the definite description the pronoun corresponds to in the antecedent VP and the elided VP is different (Sauerland, 2007a). The flat binding analysis relies on structure sharing for these cases to get the content of the definite description right, which is indicated by the lines connecting the two NPs in (2) (see section 3.3 below).

(2) The boy likes hi[~~the boy~~]'s father and the man does ~~like [the man]'s father~~

The flat binding account predicts, however, that there should be some cases where use of the same definite description in both the antecedent VP and the elided VP leads to a sloppy reading. I argue below that (3) is such a case.

(3) Every boy likes hi[~~the boy~~]'s father. Even this boy does ~~like [the boy]'s father~~

[1] I added a λ in the representation in (1-a) over the representations of Heim and Kratzer (1998) since this makes the representations easier to read when not given as trees. The most interesting other variant within the class of position-based accounts are accounts based on combinatorial logic where the storage sequence is unified with the sequence of arguments of a predicate (Curry, 1930; Geach, 1972). For my purposes in this paper, however, the differences between the combinatorial logic based account and the standard position based account do not matter, hence, I concentrate on the standard account.

The representation for a normal sloppy reading like (2) differs from the pseudo-sloppy reading (3) only by the presence of structure sharing in (2). Furthermore, the interpretations of a normal sloppy reading and a pseudo-sloppy reading of the same sentence are identical. However, pseudo-sloppy readings are expected to be less constrained than sloppy readings. The argument for pseudo-sloppy readings in this paper is therefore based on cases where the normal sloppy reading is blocked, but we nevertheless observe a sloppy interpretation where a pseudo-sloppy interpretation is predicted to be possible. Specifically, I show in this paper that Hardt's surprising sloppy reading (Hardt, 2006) are a case where normal sloppy readings are blocked, but pseudo-sloppy readings like (3) are possible. This is indicated by contrast in (4), where (4-a) does not allow a sloppy interpretation, but Hardt's (4-b) does if Bill is a boy:

(4) a. #Nearly every boy said Mary hit him. But the adult witness didnt say she did.
b. Nearly every boy said Mary hit him. But Bill didnt say she did. (Hardt, 2006, (3))

Such contrasts argue for the existence of pseudo-sloppy interpretations. These in turn corroborate the flat-binding analysis since it predicts the existence of pseudo-sloppy interpretations.

Section 2 discusses the constraint exhibited in (4) in more detail and outlines the approaches of Takahashi and Fox (2005) and Hardt (2006). As we will see neither of the two account predicts the contrast in (4): Takahashi and Fox (2005) predict the sloppy interpretation to be impossible for both examples, while Hardt (2006) predicts the sloppy interpretation to be possible in both cases. Section 3 develops the relevant parts of the flat-binding account to show that the flat-binding account actually predicts the contrast in (4). Section 4 is the conclusion.

2 Constraints on Sloppy Interpretations

Sloppy interpretations have played a major role for accounts of VP-ellipsis since at least Sag (1976) and Williams (1977) worked on the topic. The initial problem it presents for the ellipsis theorist is that a pronoun that a pronoun that is not bound like *her* in (5-a) must refer to the same individual in both the antecedent and the elided VP. But, a bound pronoun like *his* in (5-b) can refer to two different individuals; John and Bill.

(5) a. John likes her father. Bill does ~~like her father~~, too.
b. John likes his father. Bill does ~~like his father~~, too.

Working in a framework where pronominal reference is determined by positions of an abstract assignment sequence, Sag (1976), Williams (1977), and Bach and Partee (1980) all drew the following conclusions. (5-a) shows that the indices born by a pronoun in an ellipsis and the corresponding pronoun in the elided phrase must be identical. Bound

pronouns, however, could be bound within the elided VP and its antecedent as shown in (6).[2]

(6) John does $\underbrace{\lambda x\ x \text{ like } x\text{'s father}}_{\text{antecedent}}$. Bill does $\underbrace{\lambda y\ y \text{ like } y\text{'s father}}_{\text{elided}}$.

The formal system derived from predicate logic these author's assumed predicts that alphabetic variants – constituents that are identical except for the indices of bound elements and their binders – have the same interpretation. Therefore, ellipsis is expected to be licensed in (6).

The Sag-Williams analysis predicts that a sloppy interpretation should only be possible when the binder is the subject of the elided VP: Only then can the elided VP and its antecedent both contain the λ-operator binding pronouns. Sag and Williams observe cases where this prediction is borne out. Consider the contrast in (7) from Hardt (2006): While a sloppy interpretation is available for (7-a), it is blocked for (7-b).

(7) a. John said Mary hit him. Bill did $\triangle$ too
$\triangle$ = said Mary hit John / said Mary hit Bill
b. John said Mary hit him. Bill said she did $\triangle$ too
$\triangle$ = hit John / *hit Bill (Hardt, 2006, (2))

However, starting with Evans (1988) researchers found that the generalization predicted by the Sag-Williams analysis is incorrect. Evans (1988) pointed out examples with extraction like (8-a) where the traces in the antecedent and the elided VP have different binders. Later also examples with pronouns like (8) were found that do not correspond to the Sag-Williams analysis (Jacobson, 1992).

(8) a. You can tell [which parts]$_i$ Partee wrote t_i and [which parts]$_j$ Bach did ~~write t_j~~ (Evans, 1988, 125)
b. Everyone hopes that Sally will marry him, but Bill knows that she will $\triangle$
$\triangle$ = marry Bill (Hardt, 2006, (5))

Rooth (1992) proposed a new analysis of ellipsis licensing that allows ellipsis in cases like (8-a) and (8-b). In his analysis, ellipsis is licensed by a parallelism domain which must include the elided VP, but can be a bigger constituent than the just the elided VP. Rooth's statement of the parallelism furthermore uses a focus sensitive notion of parallelism according to which focussed constituents are exempt from parallelism. Specifically, Rooth's analysis requires licensing within a bigger constituent for the sloppy readings in

[2]The analysis assumes one ingredient first made explicit by Heim (1997) as the *No Vacuous Coindexing* Principle in (i). It blocks reuse of the same binder index.

(i) If an LF contains an occurrence of a variable v that is bound by a node α, then all occurrences of v in this LF must be bound by the same node α.

(8). For (8-a) the constituents relevant for licensing are indicated in (9), and also the focus on the subject of the second conjunct, which is necessary for parallelism.

(9) You can tell $\underbrace{[\text{which parts}]_i \text{ Partee wrote } t_i}_{\text{antecedent}}$ and $\underbrace{[\text{which parts}]_j \text{ [Bach]}_F \text{ did } \sout{\text{write } t_j}}_{\text{parallelism domain}}$

Rooth's analysis correctly predicts the possibility of ellipsis in (8), but incorrectly predicts that ellipsis should be licensed for the sloppy interpretation of (7-b). Takahashi and Fox (2005) show that this gap is filled by adding a condition that requires ellipsis to be maximized within a parallelism domain. Merchant (in print) showed in detail the need for this condition in cases of sloppy readings.[3] Takahashi and Fox propose to add the condition in (10) to Rooth's account of ellipsis licensing.

(10) *MaxElide* Elide the biggest deletable constituent reflexively dominated by P[arallelism]D[omain]. (Takahashi and Fox, 2005, (21))

Now the sloppy interpretation of (7-b) is correctly ruled out as shown by representation (11): The minimal parallelism domain must include the binder of the sloppy pronoun. But, then ellipsis is not maximal within this parallelism domain since ellipsis of the bigger constituent *say she hit him* is also be licensed.

(11) Bill $\underbrace{\lambda x \text{ said she did } \sout{\text{hit } x}}_{\text{minimal PD}}$

Takahashi and Fox's account correctly predicts the strict reading of (7-b) to be available since the parallelism domain can be smaller than the one indicated in (11). Furthermore, it predicts that the sloppy reading should become available if any of the material in the higher potential ellipsis target is focused and thereby blocks ellipsis. This prediction accounts for the availability of sloppy interpretations in (8).

Hardt (2006), however, shows that Takahashi and Fox's account makes the wrong prediction for the following example (repeated from (4)):

(12) Nearly every boy said Mary hit him. But Bill didnt say she did $\triangle$.
$\triangle$ = hit Bill (Hardt, 2006, (3))

Takahashi and Fox's account applied to (12) doesn't predict the sloppy interpretation to be available because ellipsis of the constituent *say she did* is licensed. Therefore, Hardt (2006) rejects the MaxElide condition and instead proposes the constraint in (13).

(13) Rebinding is possible only when necessary to satisfy parallelism.

[3] Ellipsis maximization was first suggested by (Fiengo and May, 1994, 107) in this context to the best of my knowledge.

Hardt assumes furthermore that (13) is checked sequentially for any potential parallelism domain containing the ellipsis site starting with the smallest. Whenever there is a focus domain licenses the strict reading but not the sloppy reading, the sloppy reading is blocked. Therefore, constraint (13) entails that sloppy readings should be constrained to two cases:[4] either the binder is part of the smallest parallelism domain containing the elided phrase or the binder in the antecedent is a quantifier and therefore a strict interpretation is not available.[5] Hardt's account correctly predicts (12) to permit a sloppy interpretation because the relevant binder in the antecedent is a quantifier. And for example (7-b), the sloppy reading is correctly ruled out because the strict reading is available.

However, the contrasts in (14) and (15) are problematic for Hardt's account. A quantifier is the binder in the first conjunct in all four examples. Nevertheless there is a contrast in grammaticality. I propose that the contrast is due to the fact that the binder in the second conjunct is an element of the domain of quantification of the quantifier in the first conjunct in (14-a) and (15-a), but not in (14-b) and (15-b).

(14) a. Nearly every boy said Mary hit him. But Bill didnt say she did.
b. #Nearly every boy said Mary hit him. But the adult witness didnt say she did.

(15) a. Almost every boy hopes that Sally will marry him. Even this boy hopes that she will.
b. #Almost every boy hopes that Sally will marry him, and even the teacher hopes that she will.

The generalization established is that a sloppy reading in apparent violation of MaxElide is possible if and only if the nominal binding into the elided VP denotes an individual that is an element of the domain of the quantifier binding into the antecedent VP. In the following section, I derive this generalization from the flat binding account.

[4]One further area where Takahashi and Fox's account differs from Hardt's are the examples (8). Hardt predicts (8) to be good because a quantifier binds the pronouns in the first clause, while Takahashi and Fox predict (8) to be good because some material between the binder and the minimal parallelism domain is focused. Hardt offers the absence of a sloppy reading in the example (i) to support his account. However, pragmatic factors independently create a bias towards the strict reading in (i), and the modified version in (ii) seems to allow a sloppy reading.

(i) Bill believes that Sally will marry him, but everyone knows that she won't. (Bach and Partee, 1980)

(ii) Bill still believes that Sally will marry him, but everyone else knows that she won't.

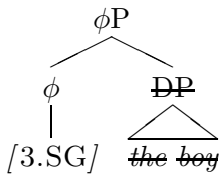
[5]Here, we are restricting our attention to examples where the elided VP is outside the scope of the binder of the antecedent clause. In other cases, quantificational antecedents can license strict readings.

3 Pseudo-Sloppy Readings

3.1 Flat Binding

The flat-binding account assumes that pronouns are always reduced definite descriptions. More specifically, pronouns are agreement heads followed by an elided DP in the structure shown in (16). In the following, pronouns are represented as him ~~[the boy]~~.

(16) him =



Languages that assign nouns to grammatical gender or noun classes provide one piece of direct evidence for the presence of a noun in pronouns. For example, a German speaker must use the appropriate gender when referring deictically to a piece of silverware: feminine *sie* for a fork, masculine *er* for a spoon, and neuter *es* for a knife. The appropriate gender is determined by the grammatical gender of the noun: *Gabel* ('fork') is feminine, *Löffel* ('spoon') masculine, and *Messer* ('knife') neuter. The same generalization – the noun class of deictic pronouns is determined by the noun class of the appropriate noun – is also observed in Bantu (Laura Downing, p.c.) and argues directly for the obligatory presence of a noun in every pronoun. Further evidence is presented elsewhere (Sauerland, 2007b, in print).

The flat binding analysis seems suitable for capturing the generalization developed at the end of the preceding section in a straightforward way: For (15-a), the representation in (17) can capture the sloppy interpretation, where VP-ellipsis should be licensed since antecedent VP and elided VP are identical. I call a sloppy reading resulting from identity of antecedent VP and elided VP as in (17) *pseudo-sloppy* since for the more familiar cases of sloppy interpretations such as (5-b) a different representation is necessary (see below).

(17) Almost every boy hopes that Sally will marry him~~[the boy]~~. Even this boy hopes that she will ~~marry him[the boy]~~.

Note that a representation like (17) would not predict a pseudo-sloppy interpretation for (15-b) since the subject of the second conjunct there, *the teacher*, is not a possible referent for *the boy*. The division between sloppy and pseudo-sloppy leads me to an account of the facts presented in the previous section where Takahashi and Fox's analysis is essentially maintained as a constraint only on sloppy readings, while Hardt's exceptions are analyzed as pseudo-sloppy readings. The goal of the remainder of this section is to integrate the flat binding account of (17) with general principles of DP and VP-ellipsis and to thereby delineate between cases where sloppy readings are available, where pseudo-sloppy readings are available, and where no sloppy interpretation is possible. This requires a more detailed understanding of the flat binding analysis.

The main concern of my 2007 paper (Sauerland, 2007b) was to show that, in any case of semantic binding, there are appropriate definite descriptions to allow the flat binding account to go through and that furthermore a general account of ellipsis would license DP-ellipsis of the definite description in all cases. Consider the two following examples:

(18) a. Every actress wrote about every singer that she likes her singing.
b. Every actress wrote about every actress that she likes her singing.

Example (18-a) raises the problem of individuals like Jennifer Lopez who is both an actress and a singer. (18) has an interpretation that is only true if Jennifer Lopez wrote to herself that she likes her singing in addition to many other acts of writing, which seems to result in non-uniqueness in representation (19).

(19) Every actress wrote about every singer that she~~[the actress]~~ likes her~~[the singer]~~'s singing

For this reason, individual concepts (i.e. functions from a set of worlds to individuals) and not bare individuals are the items stored in memory. In particular, I made use of the following definition: An individual concept x is *maximal for property* P, if and only if a) x is defined for all words w where at least one individual with property P exists and b) wherever defined x yields an individual with property P as value.[6] Now it is possible to capture Jennifer Lopez as a actress and Jennifer Lopez as a singer by using different concepts, one maximal for *actress*, the other maximal for *singer*, which both yield Jennifer Lopez as value for those worlds that are part of the common ground.

Example (18-b) leads to a further question since both quantifiers range over actresses. I (Sauerland, 2007b) argue though that the second noun phrase *actress* in examples similar to (18-b) can contain additional lexical material in the restrictors of the quantifiers. The representation (20) elaborates this proposal for (18-b).

(20) Every actress wrote about every $[\text{actress}]_F$ ~~[of interest to the actress]~~ that she~~[the actress]~~ likes her~~[the actress of interest to the actress]~~'s singing.

Note that because the property *actress of interest to the actress* is logically strictly stronger than the property *actress*, the maximal concepts corresponding to the former property are always defined for a smaller set of worlds than the later. However, any maximal concept for the property *actress of interest to the actress* also has the property *actress*. The definite *the actress* always chooses the maximal concept introduced by the quantifier *every actress* because a definite always chooses the concept with the biggest domain. Only *contextual* concepts, whose domain is exactly the context set, can be entered into discourse storage, while maximal concepts only remain in memory within a sentence. In sum, the partial salience order among concepts a definite description refers

[6] Properties are of type $\langle e, \langle s, t\rangle\rangle$ and adopt the convention a concept x has property P if and only if for all $w \in \text{domain}(P)$ the statement $P(x(w))(w)$ holds.

to is the following:[7]

1. maximal concept in memory with wide domain, i.e. maximal *actress*-concept
2. maximal concept in memory with small domain, i.e. maximal *actress of interest to the actress*-concept
3. contextual concept in memory, i.e. set of *actress*-concept corresponding to the actresses under discussion
4. concept not in memory, i.e. concepts of actresses in the current context set

As representation (19) illustrates, I assume that there may be both partial ellipsis or total ellipsis applying at the DP level. Both kinds of ellipsis may be licensed by a bigger parallelism domain like VP-ellipsis in Rooth's analysis (see above). For ellipsis licensing in DP, I apply the principle of deletion up to recoverability (Chomsky and Lasnik 1993 and others), where I assume that what needs to be recovered is the referent of the DP. Spelling out the condition requires several case distinctions depending on the category of the parallelism domain: definite DPs, other NPs and finally TPs. First consider definite DPs that do not contain a focus: Two structures are defined to be *Ellipsis Alternatives* if their phonological representations are identical. Then, a definite DP that contains no focus is licensed as a parallelism domain if and only if there is no ellipsis alternative DP$'$ such that DP$'$ refers grammatically to a concept x' that has as its domain a superset of the domain of the concept that DP refers to. This case is for example relevant to pronouns, which are elided DPs and therefore must not contain any focus. For example, ellipsis in *she~~[the actress]~~* in (19) is licensed by this principle because the quantifier *every actress* introduces a maximal actress concept, which has maximal salience for *actress*. However, licensing of the two other ellipses in (19) does not follow yet.

The third condition licenses a definite DP that contains a focus as a parallelism domain: the most salient focus alternative of XP must be more salient than the most salient focus alternative for any focus alternative of XP. This condition is relevant for licensing ellipsis in *every [actress]$_F$ ~~[of interest to the actress]~~*. Two further assumptions I make are the following: One, the processing of *x write about* makes salient the set of people x might write about, i.e. the set of people that are of interest to x is added to memory. Two, ellipsis with NP as parallelism domain is licensed if ellipsis of the definite DP consisting of *the* and the NP is licensed. With these assumptions, ellipsis of the adjunct in *every [actress]$_F$ ~~[of interest to the actress]~~* is licensed: The focus alternative *the people of interest to the actress* refers to the concept of people of interest to the actress. And furthermore, though there is one ellipsis alternative referring to a more salient concept, namely *the actress* referring to the maximal actress-concept, using *the actress* to refer to the maximal actress concept is ruled out by MaxElide.

Finally, consider the ellipsis in her~~[the actress of interest to the actress]~~. Why is the ellipsis alternative strikeout[the actress] not preferred though it refers to a more salient

[7] I added the case of a concept not yet in memory where I assume a definite *the P* picks out the contextual concept referring to the plurality of all entities with property P in each world of the context set. Sauerland (2007b) uses a second concept of salience in the account of number agreement. This is not relevant in the following. The concept of salience use here corresponds to d-salience

concept? In this case, ellipsis must be licensed with TP as a parallelism domain. The antecedent for *she~~[the actress]~~ [likes]$_F$ her~~[the actress of interest to the actress]~~ [singing]$_F$* can be the sentence *Every actress wrote about every actress ~~[of interest to the actress]~~ that ...* since *write that ... about* is a focus alternative to *like* via the inference from *x writes about y* to *x knows y*.[8]

3.2 Deriving Pseudo-Sloppy Readings

The system derives pseudo-sloppy readings in a different way from normal sloppy readings. Consider first case (15-a) of a pseudo-sloppy reading. The representation of this reading in shown in (21).

(21) Almost every boy hopes that Sally will marry him~~[the boy]~~.
Even the [demonstrative] boy hopes that she will ~~marry him[the boy]~~.

The universal quantifier *every boy* adds a maximal boy-concept, but also the contextual concept of all the boys to the memory. The pronoun *him~~[the boy]~~* refers to the maximal concept resulting in the bound interpretation. Then in the second clause, *the [demonstrative] boy* selects a contextual *boy*-concept – I assume that the feature *[demonstrative]* is interpreted as the property of being indicated by the center of a possible world through a gesture. Therefore, two contextual *boy*-concepts – that of all boys and that of the demonstrated boy – are contained in the memory set when *him~~[the boy]~~* is interpreted.[9] However, the singular marking of the pronoun *him* in the antecedent and the recency of *this boy* makes the singular concept it introduced the preferred antecedent for *his*. Finally ellipsis of the VP is licensed for any parallelism domain containing the VP because it is exactly identical to the antecedent.

Note that a pseudo-sloppy reading is predicted to be impossible in (22-a) in contrast to (22-b) because in (22-a) the maximal boy-concept remains available when the elided VP is interpreted.

(22) a. Almost every boy claims that Sally will marry him and that even this boy claims that she will.
b. Almost every boy claims that Sally will marry him. Even this boy claims that she will.

[8] Fox (1999) argues that inferencing can be involved in ellipsis licensing. That elided material is part of antecedent does not block ellipsis in this case because the parallelism domain containing the ellipsis contains a focus in a relevant position (cf. Sauerland 2004).

[9] The concept contributed by the quantifier seems to be available, too: Examples like (i) at least in German allow an interpretation where the store-keeper hopes that Mary will buy all the cats. A possible scenario for (i) is the following: In an animation movie, a pet store-keeper does not treat his cats very well. Mary enters the store and is looking at the cats. All the cats want to be bought and the store-keeper is hoping to make a lot of money.

(i) Every cat hopes that Mary will buy it. And the store-keeper does △, too.

The mechanism deriving pseudo-sloppy readings directly predicts the generalization observed at the end of the previous section: pseudo-sloppy readings are only available if the DP binding into the elided clause is an element of the range of the DP quantifier in the first clause. For example, observe representation (23) for (15-b). The DP *the boy* in the elided VP cannot refer to the teacher as would be necessary for the pseudo-sloppy interpretation.

(23) Almost every boy hopes that Sally will marry him~~[the boy]~~.
Even the teacher hopes she will ~~marry him[the boy]~~.

3.3 True Sloppy Readings

The account for pseudo-sloppy readings does not derive most cases of sloppy readings considered in the literature. To derive true sloppy readings within the flat-binding analysis, I developed an account in Sauerland (2007a) as already mentioned above. The account is based on the syntactic idea of structure sharing. (24) is an example exhibiting a true sloppy reading. If the elided VP has *like the boys father* in (24), only the strict reading results.[10]

(24) The boy likes his father and the man does too.

For the sloppy interpretation of (24) the representation in (25) is therefore necessary. Representation (25) makes us of structure sharing (or multi-dominance) (Gärtner 2002 and others). Specifically, the word *boy* is linked to the two positions of the structure marked with *XXX* and correspondingly *man* is linked to the two positions marked with *YYY*.

(25) Every XXX likes hi[the ~~XXX~~]'s father and
boy
the [YYY]$_F$ does ~~like hi[the YYY]'s father~~, too.
man

Furthermore the first position *man* is linked to is part of a focussed phrase. I define the focus alternatives of an LF-constituent YP as all phrases that are identical to YP except for the constituents dominated by an focus marking F. With this definition, the first conjunct of (25) is a focus alternative of the second conjunct because *man* is dominated by an F. Therefore, ellipsis is predicted to be licensed in (25) applying the ellipsis licensing assumptions of Rooth (1992).

Without the structure sharing relationship the sloppy interpretation of (24) cannot be licensed as the two candidate representations in (26) show: Representation (26-a) would receive the right interpretation, but because only the first occurrence of *man* is focussed

[10]For simplicity, the representation (24) does not represent movement of the subject, which I actually assume to be necessary.

(i.e. dominated by an F-mark), the first conjunct is not a focus alternative of the second. In (26-b) ellipsis is licensed, but in the second conjunct there is no unique salient boy that the definite description *the boy* could refer to as I argue in the following paragraph.

(26) a. Every [boy] likes hi~~[the boy]~~'s father and
the [man]$_F$ does ~~like hi[the man]'s father~~, too.
b. Every [boy] likes hi~~[the boy]~~'s father and
the [man]$_F$ does ~~like hi[the boy]'s father~~, too.

Furthermore the account predicts precisely the MaxElide constraint for true sloppy readings (Sauerland, 2007a). This can be seen quite easily: The key mechanism of the account of Takahashi and Fox (2005) is that ellipsis is not licensed in parallelism domains that do not include the binder of a sloppy pronoun. We can verify that this property is a corollary of the present account by looking at representation (25), specifically by considering the parallelism domain that consists of only the elided VP in (27). In this VP, the lexical item *man* is only dominated by one position and it is not dominated by an F-feature in this position. The mechanism of forming focus alternatives only can see the focus dominating the other position *man* is linked to if that position is part of the parallelism domain. Therefore the first conjunct of (24) does not provide an antecedent that would license (27) as a parallelism domain.

(27) ~~like hi[the YYY]'s father~~
|
man

It follows that parallelism domains must include the binding DP when ellipsis in a true sloppy interpretation is licensed. If we then adopt MaxElide from Takahashi and Fox (2005), all their results follow as constraints on true sloppy readings. Pseudosloppy readings, on the other hand, are not expected to be subject to the MaxElide constraint in the same way since Pseudosloppy readings are compatible with narrow parallelism domains.

4 Conclusion

The argument in this paper is based on data from the availability of sloppy interpretations with VP-ellipsis in English. In particular, it explained the contrast in (28): (28-a) allows a sloppy interpretation, while (28-b) does not.

(28) a. Nearly every boy said Mary hit him. But Bill didnt say she did. (Hardt, 2006, (3))
b. Nearly every boy said Mary hit him. But the adult witness didnt say she did.

The generalization underlying contrast (28) was shown to hinge on the question whether the subject of the second conjunct was an element of the domain of quantification in the first conjunct: *Bill* in (28-a) must be understood to refer to one of the boys quantified over in the first conjunct for the sloppy interpretation to be possible, but *the adult witness* in (28-b) cannot refer to a boy.

The generalization does not as far as I can see follows on position based accounts of binding. It follows however on the flat binding account of Sauerland (2007b). On this account, all pronouns are analyzed as covert definite descriptions. In particular, the first conjunct in (28) would be analyzed as *Nearly every boy said Mary hit him~~[the boy]~~*. The difference between (28-a) and (28-b) then derives from the fact that, if we insert in the second conjunct in (28-a) a VP exactly identical to VP in the first conjunct, an apparently bound reading results: *him* in *Bill didn't say Mary hit him~~[the boy]~~* can be interpreted as Bill if Bill is a boy. Since this mechanism does not derive true sloppy readings, I call the sloppy readings of example like (28-a) pseudo-sloppy. I furthermore showed that the mechanism deriving true sloppy readings within the flat binding analysis does not predict a sloppy reading for either example in (28). Therefore the contrast is accounted for completely. Since I do not know of a similar account on other analyses of binding than the flat binding analysis, the result supports the flat binding analysis.

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On the Cross-Linguistic Variation of 'One-Step Past-Referring' Tenses *

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Abstract

This paper proposes a new look at the so-called 'present-perfect puzzle'. It suggests that it is in fact part of a bigger problem, concerning all tenses in a language situating an event one step before the moment of utterance.

I argue that present perfects compete with simple past tenses, and that the distribution of these tenses shows signs of the impact of this competition. The outcome of the competition is argued to be heavily dependent on which of the two tense-forms is the default.

A pragmatic theory is proposed which accounts for the reduced distribution of the present perfect in languages like English and Spanish, and the reduced distribution of the simple past tense in languages like French and German.

1 Introduction

The cross-linguistic variation of the present perfects has received much attention in recent years. As far as I am aware, all scholars involved in the discussion base their claims in one way or another on the influential paper by Portner (2003). This article has been criticised in various aspects. However, the crucial assumption of Portner has remained unchallenged: the behavior of the present perfect in languages like English is to be explained in the core-grammar of the languages involved, that is, either in syntax or semantics. More precisely, according to Portner and his followers, the culprit of the rather eccentric behavior of the present perfect in such languages is — in one way or another — the present tense feature.

The aim of the present paper is threefold: first, I will show that any theory making the assumption of a semantic or syntactic origin for the variation of the perfect tenses will

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fail, because there is data which contradicts this basic assumption. Second, I will show that the present perfect is not the only tense to vary cross-linguistically: the simple past tense does so, too. Crucially, the simple past tenses vary in a way that is interrelated with the variation of the present perfect tenses. Thirdly, I will propose a new, pragmatic and competition-driven account of the distribution of what I call "one-step past-referring tenses". One-step past-referring tenses are tenses which locate an eventuality (or an interval of assertion in the sense of Klein (1994), depending on your favorite theory of what a *tense* should do) prior to the moment of utterance, but without the intervention of a secondary point of reference, as would be the case with a pluperfect.

The paper is structured as follows: I will first lay out the present perfect puzzle as it has been stated by Portner (2003) and his followers. As far as I can see, this is generally agreed upon. Then, I will present some solutions to this problem, and outline very briefly the problems they face. After that, I will introduce the idea of competition between present perfects and simple past tenses, and present the data which a grammar-driven approach to the present perfect variation cannot handle. I suggest that in a language like English or Spanish, the present perfect is the loser of the competition, whereas in French or German, the simple past tense shows evidence of being blocked in certain contexts.

Finally, the last section presents the analysis I am advocating. It is based on standard assumptions on the semantics of the simple past tense and the present perfect tense, and uses Gricean pragmatics to explain the respective distributions of these tenses in languages like English vs. languages like French.

2 The Present Perfect Puzzle

It is a well-known fact that present perfects differ cross-linguistically. In languages like English or Spanish, the present perfect does not combine felicitously with past-denoting temporal adverbials like *yesterday* or *at five o'clock*.[1]

(1) a. *John has arrived yesterday | at five o'clock.
b. *Juan ha llegado ayer | a las cinco.
J. has arrived yesterday | at the five.

In languages like French or German, such combinations are perfectly felicitous:

(2) a. Jean est arrivé hier | à cinq heures.
J. is arrived yesterday | at five o'clock.
b. Hans ist gestern | um fünf gekommen.
H. is yesterday | at five come.

[1]These are the *definite* past expressions of Klein (1992), opposed to *indefinite* past expressions like *on Mondays* and the like, which are acceptable with the present perfect.

Another difference between these two types of present perfects are the so-called "life-time" effects: dead persons or no longer existing objects are not felicitous in subject-position with a present perfect in English and Spanish:

(3) a. #Einstein has visited Princeton.
b. #Einstein ha visitado Princeton.
E. has visited Princeton.

According to Portner (2003), (3a-b) are not agrammatical. However, they require Einstein to be alive in order to be felicitously uttered. In languages like French or German, no such life-time effect obtains:

(4) a. Einstein a visité Princeton.
E. has visited P.
b. Einstein hat Princeton besucht.
E. has P. visited.

Various explanations for this pattern have been suggested. Scholars like Klein (1992, 2000) have proposed that there is a parametric variation between the PERFECT-features of languages like English and those of languages like German.

However, as Portner showed convincingly, this cannot be the answer to our problem: in English, the only perfect-form concerned by the restrictions observed so far are the present perfects. All other perfect forms, like future or past perfects, but also perfects embedded under modals, or involved in participial constructions,[2] exhibit no restrictions against localizing past-denoting expressions:

(5) a. Mary had arrived yesterday.
b. Mary will have arrived yesterday.
c. Mary might have arrived yesterday.
d. Having arrived yesterday, Mary will be able to accompany us tomorrow.

This is not specific to English: the Spanish perfects pattern alike:

(6) a. María había llegado ayer.
M. had arrived yesterday.
b. María habrá llegado ayer.
M. will have arrived yesterday.
c. María debería haber llegado ayer.
M. should have arrived yesterday.
d. Habiendo llegado ayer, María podrá accompañarnos.
Having arrived yesterday, M. will be able to accompany us.

[2]In order to refer to all these perfects forms, in the rest of the paper I will use the term of '*non-present* perfects'.

As is to be expected, French or German perfects do not show any restrictions in these tenses, either:[3]

(7) a. Marie était arrivée hier.
M. was arrived yesterday.
b. Marie sera arrivée hier.
M. will be arrived yesterday.
c. Marie pourrait être arrivée hier.
M. could be arrived yesterday.
d. Étant arrivée hier, Marie pourra nous accompagner.
Being arrived yesterday, M. will be able us accompany.

(8) a. Maria war gestern angekommen.
M. was yesterday arrived.
b. Maria wird gestern angekommen sein.
M. will yesterday arrived be.
c. Maria könnte gestern angekommen sein.
M. could yesterday arrived be.

The restrictions against localizing temporal expressions are not the only ones to vanish with non-present perfects: as can be shown, there are no life-time effects either associated with these tenses.

(9) In 1942, Hitler attacked Russia. Napoleon had tried before him, but without success.

If there were any life-time effects to be observed with a pluperfect in English, one should expect them to arise at a contextually fixed moment of reference (the Reichenbachian R (cf. Reichenbach, 1947/1966)). In (9), the discourse context fixes R at the year 1942. But at this moment, Napoleon had long been dead. However, (9) remains felicitous. Thus, there is no life-time effect. As is to be expected, German and French pluperfects do not show any life-time effects either in such a context.[4]

The conclusions that have been drawn from these facts are the following: the English (and Spanish) present perfects have restrictions they do not share with any other perfect construction in the respective language. On the other hand, non-present perfects seem to be rather similar cross-linguistically. Furthermore, the German and French present perfects behave in a way that is consistent with non-present perfects not only in these two languages, but also in English and Spanish.

[3]In German, one cannot use the participial construction as freely as in English. The sentence corresponding to (5d) would not be acceptable in German, for reasons however that do not concern the perfect.

[4]For want of space, I have to omit the demonstration that there are no life-time effects with any perfect in French or German, and that the Spanish pluperfect behaves like the English pluperfect with respect to life-time effects.

Therefore, there are good reasons to believe that the French and German present perfects are not odd perfect tempora, lacking the typical current relevance restrictions characteristic for such tenses, as is assumed for instance in the typological litterature of what is sometimes called the "Bybee-Dahl school" (cf., for instance Bybee & Dahl, 1989). It appears on the contrary that German or French present perfects are more in line with the general perfect behavior than their English or Spanish equivalents.

Much of the recent litterature has tried to explain how the restrictions applying to the present perfect come about, without abandoning the idea of a unified semantics for the PERFECT-feature in languages like English or Spanish.

2.1 The 'Present-Tense-As-Culprit' Solution

One of the the most appealing aspects of Portner (2003) is the fact that he manages to give a unified account of the PERFECT-feature in English, by shifting away the problem from the perfect itself to the PRESENT-tense feature. As far as I am aware, all subsequent work has followed him in this move, although his account of the perfect has been contradicted on several points and has been subsequently heavily modified.

Because of the very limited space available, I will have to be rather brief about the individual proposals; I will however try to show their interest and where they run into problems. For a more detailed presentation and criticism of the proposals, I invite the interested reader to consult Rothstein (2006) or Schaden (2007).

Portner proposes that the impossibility of a sentence like (1) is due to the clash of two different presuppositions: an Extended-Now (XN) presupposition triggered by the present tense, and a non-XN feature triggered by the localizing temporal adverbial.

(10) a. XN presupposition of the Present Tense: A present tense sentence is only usable in context c if the event it describes falls within c's Extended Now.[5]
b. For any past time adverbial α, the use of α in context c presupposes that no event e described by α in c overlaps c's Extended Now.[6]

When a sentence like (1) occurs, we therefore have two presuppositions which cannot be satisfied at the same time. Therefore, such a sentence is out. But, as Nishiyama & Koenig (2004, 102f.) have pointed out, the problem does not seem to be presuppositional. It is a standard assumption that one can attack presuppositional content by the means of metalinguistic negation. However, a life-time effect is not affected by metalinguistic negation:

(11) #Einstein has not visited Princeton. He is not alive.

The proposal of Rothstein (2006) is very much in the spirit of Portner, and follows the

[5]Cf. Portner (2003, 496).
[6]Cf. Portner (2003, 496).

lead of Musan (2002): according to this idea, in languages like English and Swedish, the present feature is able to restrict the choice of the localizing temporal adverbial, whereas in languages like German, this is not the case. He assumes a basically syntactic mechanism, where something like a non-past feature of the PRESENT enters in conflict with the past-denotation of the temporal adverbial. Basing his proposal on syntactic c-command, Rothstein predicts that in languages with restricted present perfects, the temporal adverbial is c-commanded by the perfect auxiliary, and therefore, the auxiliary is able to restrict the choice of the temporal adverbial. In languages with an unrestricted present perfect tense, the perfect auxiliary does not c-command the temporal auxiliary, and is not able to interfere with the selection of a temporal adverbial. However, as I have argued in (Schaden, 2007, p. 67ff.) this proposal, designed for the Germanic languages, cannot be applied to French.

Pancheva & von Stechow (2004) came up with another way of attributing the perfect variation to the PRESENT-feature. They suppose in their analysis for English and German that these two languages have different present tense features. However, in their analysis, the present tenses of English and German do not differ with respect to their presuppositions, but with respect to the temporal semantics. The intuition behind the formulae in (12) is that the German present is a non-past, whereas the English would be a 'real' present tense (cf. Giorgi & Pianesi, 1997).

(12) a. $[\![\text{present}]\!]_E = \lambda p.\lambda i[i = n \wedge p(i)]$ [English]
b. $[\![\text{present}]\!]_G = \lambda p.\lambda i[n \preceq i \wedge p(i)]$ [German]
where $t \preceq t'$ iff there is no $t'' \subset t'$ such that $t'' \prec t$.

However, what one should generally expect according to such a proposal is that languages with similar present tenses have similar present perfects. But this is not the case, as has been argued by (Rothstein, 2006, p. 82ff.). The Swedish present tense patterns systematically with the German present tense against the English present, yet the Swedish present perfect behaves like the English present perfect: it does not allow for a past adverbial to apply to the present perfect.

Therefore, Rothstein argues that the conclusion to be drawn from this is that the behavior of the present tense in a language is not correlated with the behavior of the present perfect in the same language.

2.2 Are there Morphological Reasons for the Variation?

In the languages we have considered so far, there is a morphological fact that might play a role for the distribution of the present perfect: English and Spanish have only one perfect auxiliary, namely *have*, whereas French and German have two perfect auxiliaries, namely *have* and *be*.

(13) a. English:
(i) I have arrived.
(ii) I have sung.

b. Spanish:
(i) He llegado.
have arrived.
(ii) He cantado.
Have sung.

(14) a. French:
(i) Je suis arrivé(e).
I am arrived.
(ii) J' ai chanté.
I have sung.

b. German:
(i) Ich bin angekommen.
I am arrived.
(ii) Ich habe gesungen.
I have sung.

However, as shown by (Rothstein, 2006, p. 76f.), this is no general pattern correlated with the distribution of the present perfect: the Danish perfect has two auxiliaries, *have* and *be*, but nevertheless, it's perfect shows an English-like distribution:

(15) a. *Han er kommet igår.[7]
He is come yesterday.

b. *Han har arbejdet igår.
He has worked yesterday.

Therefore, the fact of having one or more perfect auxiliary does not play a role either in the distribution of the present perfects and their cross-linguistic variation.

2.3 The Basic Assumption and Some Reasons to Disagree with them

Summing up: none of the analyses I have considered here assumes that the semantics of the PERFECT-feature is involved in the cross-linguistic variation of the present perfects. Such a position has some important advantages. First of all, languages like English may be assigned one single value for the PERFECT-feature, even though the restrictions on present- and non-present perfects are not the same. Taking this reasoning further, one can assume cross-linguistically one single value for the PERFECT-feature. This is a consequence of the analysis that one should try to maintain.

All analyses assume that the cause of the variation of the present perfects — as it cannot be the perfect — must be in some way the PRESENT. While the exact implementation of this idea varies widely, the basic incompatibility is always the one between the PRESENT-feature and some other element of the sentence.

Finally, all analyses assume that the cause for the cross-linguistic variation of the present perfect is rooted somewhere in the semantics or the syntax, that is, somewhere in the core-grammar of the language. This means that these analyses are committed to the view that sentences like (1) — repeated below — are *agrammatical*.

(1) a. *John has arrived yesterday | at five o'clock.

[7]Examples in (15) taken from Rothstein (2006, p. 76.).

b. *Juan ha llegado ayer | a las cinco.
J. has arrived yesterday | at the five.

However, in the (not so recent) literature, as well as in corpora, such examples are attested for both English (cf. (16)) and Spanish (cf. (17)):

(16) a. We *have received* information on F.S. from you *on the 22nd of September last.*[8]
b. In the event my Lord, erm, that er your Lordship felt that further guidance was required, there are the two routes that I'*ve indicated* to your Lordship briefly *yesterday*, [...][9]

(17) a. Don Fulano de Tal y Tal *ha muerto ayer*, a las seis de la
D. F. d. T. y T. has died yesterday, at the six of the
tarde.[10]
afternoon.
b. [...] estaba previsto en primer término rendir un muy merecido
[...] was planned in first place give a very deserved
homenaje a una figura de las letras argentinas que *ha fallecido*
homage to one figure of the literature Argentinean that has deceased
ayer, Adolfo Bioy Casares.[11]
yesterday, A. B. C.

So even if the constraints observed with present perfects in English and Spanish are very strong tendencies, they do not seem to be inviolable. Let me state clearly what I think this data does, and does not, show. I do not claim that (17) or (16) are 'normal' or common — they clearly are not. Nor do I claim that they mean the same thing as the corresponding sentences with a simple past — I do think that they are quite different. Finally, I do not claim that something is 'grammaticalizing' here, and that English or Spanish present perfects are evolving into something more 'past-tense'-like. I merely want to point out that — even in languages like English and Spanish — there are circumstances, marginal though they may be, in which a combination between a present perfect and a past-denoting localizing temporal expression is *possible*. Now, if the reason for the oddness of sentences like (1) was rooted in the core-grammar of the language, such sentences should never be possible. Therefore, I believe that a theory which assumes that syntax or (compositional) semantics are at stake in such sentences must be wrong.

Secondly, I believe that any theory focusing exclusively on the behavior of the present perfect tense across languages (which is the case for all formal theories I am aware

[8]Example taken from Maurice (1935), cited from McCoard (1978, 129).
[9]Example (16b) found in the *British National Corpus* [11-09-2007]. Query: "`has _ yesterday`".
[10]L. Rosales, *Cervantes y la libertad*. REAL ACADEMIA ESPAÑOLA: Banco de datos (CORDE) [online]. Corpus diacrónico del español. `http://www.rae.es` [11-09-2007].
[11]Recorded in a meeting of the Argentinean Senate, 1999, REAL ACADEMIA ESPAÑOLA: Banco de datos (CREA) [online]. Corpus de referencia del español actual. `http://www.rae.es` [11-09-2007].

of) misses an important empirical generalization: the distribution of the present perfect tense in a given language is interrelated with the distribution of the corresponding simple past tense. The more restricted the former is, the less restricted the latter, and vice-versa. This is what I will show in the next section.

3 Competition With and Against the Simple Past

In all languages under consideration here, the present perfect competes against a simple past tense. For the sentences in (1), the correct version in English and Spanish requires the simple past tense, whereas in German and (with some restrictions[12]) French, one *could* have used the simple past tense in such a configuration:

(18) a. Mary arrived yesterday | at five o'clock.
b. María llegó ayer | a las cinco. (Spanish)
M. arrived yesterday | at the five.
c. Maria kam gestern | um fünf an. (German)
M. arrived yesterday | at five on.
d. Marie arriva *hier | à cinq heures. (French)
M. arrived yesterday | at five o'clock.

Similarly, in order to eliminate the life-time effects in English and Spanish, one must use the simple past tense in these two languages. In German and French, one could have used the simple past tense, as well:

(19) a. Einstein visited Princeton.
b. Einstein visitó Princeton.
E. visited P.
c. Einstein besuchte Princeton.
E. visited P.
d. Einstein visita Princeton.
E. visited P.

So, the question one should ask is the following: Could it be that the determining influence in the variation of present perfect tenses is not the present tense, but the simple past tense? Clearly, if competition were a determining factor in the present perfect puzzle, one would expect there to be restrictions of the simple pasts as well. In what follows, I will argue that there is a cross-linguistic variation of simple past tenses mirroring the variation of the present perfects.

There are indeed restrictions on the use of a simple past tense in German, which do not exist in English. Kratzer (1998) observed that in a context where speaker and hearer

[12]The French *passé simple* is no longer compatible with expressions like *yesterday*, which are strongly linked to the deixis.

stand in front of the church, (20a) is infelicitous, whereas (20b) is fine:[13]

(20) a. #Wer baute diese Kirche? Borromini baute diese Kirche.
who built this church? B. built this church.
b. Who built this church? Borromini built this church.

As Kratzer noted, for German, the use of the present perfect in such a context is obligatory. Interestingly, exactly the same opposition can be observed between French and Spanish:

(21) a. #Qui construisit cette église? Borromini construisit cette église.
Who built this church? B. built this church.
b. ¿Quién construyó esta iglesia? Borromini construyó esta iglesia.
Who built this church? B. built this church.

This observation did not have much impact on the research about the present perfects, or the simple past tenses; Kratzer herself doesn't seem to have pursued this issue further. However, it is a general fact that, in French and German, in some situations one simply cannnot use the simple past tense:

(22) [Archimedes in his bath ...]
a. I found it!
b. ¡Lo encontré!
it found
c. #Ich fand es!
I found it
d. #Je le trouvai!
I it found

(23) [Kasparov to Deep Blue ...]
a. I won!
b. ¡Gané!
won
c. #Ich gewann!
I won
d. #Je gagnai!
I won

Suppose the sentences in (23) and (22) are preceded by an exclamation like *Oh my God!* or *Yesss!*. Intuitively, in such sentences, the center of attention is not so much the event in itself, but rather a consequence of that event for the moment of utterance. For instance, (23) does not state only that there was a winning event; it is more about the speaker being a winner at the moment of utterance. Similarly, (22) is not so much about a past event of `finding`, but a statement of a present `having`. Such statements can be accomplished with English or Spanish simple pasts, but not with their German or French equivalents.

It is important to notice that in (22) and (23), it is not temporal proximity that is at stake. The issue is rather the presence of immediate repercussions of the event with respect to the moment of utterance. In some way, it is an equivalent of a "hot news" perfect. The simple past of German and French is inadequate as a "hot news" past, whereas the English and Spanish simple pasts may have such a meaning component.

[13]Examples in (20) from Kratzer (1998).

For contexts like (23) or (22), one *has to* use a present perfect in French or German, and one *can* use a present perfect in English or Spanish.

The generalization I would like to propose is therefore the following: in English and Spanish, you can (almost) always use the simple past tense, and sometimes, you have to use the simple past tense. In these latter contexts, the present perfect is blocked. In German and French, you can (almost) always use the present perfect, and sometimes, you have to use the present perfect. In these latter contexts, the simple past is blocked.

4 A Pragmatic Analysis

I have suggested in the preceding section that the cross-linguistic variation of the present perfect and the simple past are interrelated, and that one should not try to resolve it in the core-grammar (that is, syntax or compositional semantics). Therefore, the variation must be resolved in pragmatic terms, which however have to interact with a language-specific parameter. In order to be as explicit as possible, I will present first the compositional semantics I am assuming, before presenting the pragmatic proposal.

4.1 Semantic Underpinnings

I suppose the following semantics for the simple past tense and the composition of the PRESENT with the PERFECT, for English as well as German, French and Spanish (cf. Portner, 2003; Nishiyama & Koenig, 2004; Schaden, 2007):

(24) a. $[\![\text{past}]\!] = \lambda p \exists i[i \prec n \wedge p(i)]$
where n is the moment of utterance, i an interval, and p a variable over propositions. '$\prec$' denotes a relation of strict precedence.

b. $[\![\text{present} \circ \text{perfect}]\!]$[14] $= \lambda p \exists i, i', s[n \subseteq i \wedge i' \prec i \wedge Q(s) \wedge i \subseteq \tau(s) \wedge p(i')]$
where n is the moment of utterance, Q a free variable, and s is the perfect state

[14] This relation is composed from the following two basic functions:

(i) a. $[\![\text{present}]\!] = \lambda p \exists i[n \subseteq i \wedge p(i)]$
b. $[\![\text{perfect}]\!] = \lambda p \lambda i \exists i', s[i' \prec i \wedge Q(s) \wedge i \subseteq \tau(s) \wedge p(i')]$
where Q is a free (predicate) variable, and s is the perfect state

Kjell Johan Sæbø (p.c.) brought up the question of whether the analysis I am proposing really requires such a rich semantics for the perfect, or if a lighter version would do. As far as I can see, I am minimally committed to the assumption that the PERFECT-feature encodes some relation of (strict) anteriority and that it provides some means of encoding a link between the event and a contextually fixed moment of reference.

Therefore, any theory of the perfect in DRT I am aware of (cf. Kamp & Reyle, 1993; de Swart, 1998; Reyle et al., 2005) and some Extended-Now-theories (cf. Rathert, 2001) could serve as a semantic support for my pragmatic analysis.

(24ab) have some important properties in common: they both situate an interval (the interval of assertion, according to Klein (1994)) in the past with respect to the moment of utterance. In principle, both should be available when it comes to situating an event in the past. However, the present perfect introduces a *Perfect State* at the moment of utterance (cf. Nishiyama & Koenig, 2004). The exact nature of Q of the perfect state must be infered by the listener through pragmatic reasoning. I assume that the restrictions on the use of the present perfect and past tenses are (basically pragmatic) consequences of the presence (or absence) of the perfect state, in contexts where the absence (or presence) of such a state would have been expected.

4.2 The Pragmatics

The basic assumption for the pragmatic analysis is the following: a speaker has to choose from two alternative ways of expressing that the interval of assertion is situated before the moment of utterance. One of the alternatives will be the default form, the other one will be marked. The use of the marked form will trigger additional, pragmatic inferences. Depending on which form is the marked one, the pragmatic effects will be different. The two possible configurations I assume are the following:

(25) a. English, Spanish:

Unmarked form:	Marked form:
Simple past tense ⇓ no pragmatic effect	Present perfect ⇓ triggers pragmatic reasoning

b. French, German:

Unmarked form:	Marked form:
Present perfect ⇓ no pragmatic effect	Simple past tense ⇓ triggers pragmatic reasoning

The main difference between a simple past and the present perfect tense is the presence of a perfect state in the latter. Therefore, the pragmatics will capitalize on the presence or absence of a perfect state.

Let us now consider the two possible cases. Suppose first that the simple past is the default form (which is the case in English and Spanish). Therefore, the default is *not* to use a perfect state for events situated before the moment of utterance. Now, if the speaker uses the simple past (i.e., the default), the event under consideration may or may not have any particular consequence for the moment of utterance. However, if the speaker uses the marked present perfect, the addressee will have to suppose that there was some reason to use the non-default tense-form. Introducing a perfect state, when there was no need to, can only be interpreted in the following way: the listener intended to convey a special link between the event under consideration and the moment of utterance.

Suppose now that the present perfect is the default form (which is the case in French and in German). The use of the default is — like before — non-commital as to the existence or not of any specific consequence of the event for the moment of utterance. However, if the speaker uses the marked simple past tense, the hearer will infer that there was some good reason to omit the perfect state. Therefore, the addressee will conclude that the speaker commits to the non-existence of special consequences of the event for the moment of utterance.

Before showing that this line of argumentation is able to explain the incompatibilities affecting the simple past tenses and present perfect tenses, let me point out two consequences of this analysis: first of all, it predicts that other perfect forms — which are not competing with a perfect-state-less tense-form — will not show any of the restrictions we observe with (some) present perfects. This prediction seems to be borne out.

Second, a competition-based account comes with a typological prediction: no language having only one one-step past-referring tense (as, for instance, Latin) should display restrictions reminiscent of the present perfect or simple past puzzles. However, if a semantics- or syntax-based account is correct, such a language might exist.

4.3 Where do the 'Incompatibilities' Come From?

In this last section, I will discuss one by one the different 'incompatibilities'[15] we have seen so far. I propose that they can be accounted for with standard Gricean maxims.

Let us start with the incompatibility of the simple past tense with direct present results. This incompatibility arises in languages where the present perfect is the default form, such as German and French. The marked form in these languages thus lacks a perfect state. When a speaker chooses the marked form, without perfect state, there must be some reason to do so. The hearer will infer that this reason is that the event under consideration has no tangible consequence at the moment of utterance, and does not justify the presence of a perfect state at the moment of utterance. Using a simple past in such a context would be a violation of the quantity-maxim: *say as much as you can.* A speaker anticipating this reasoning should therefore avoid the use of a simple past tense in a context where (s)he wants to convey direct present results for the event under question.

Next, let us consider the incompatibility of the present perfect with localizing, past-denoting temporal adverbials like *yesterday.* This arises in languages where the simple past tense is the default form for referring to an event situated before the moment of utterance. The reasoning leading to avoidance of this combination is the following: if the event itself and its localization is important, why bother to introduce a result state, if the default is not to introduce one? The preference for the simple past in such a context is an instance of a quantity maxim: *do not say more than you need.* Yet, if the localization of the event as well as the existence of a perfect state at the moment

[15] I put the word 'incompatibility' in quotes because I do not think that we are faced with an impossibility, but rather with a strong dispreference. Keeping this in mind, I will omit the quotes in the remainder of the paper.

of utterance are important, one might find such combinations. The corpus-examples in (16) and (17) seem to be of that type.

Finally, let us consider life-time effects. These arise also in languages where the default one-step past-referring tense is the simple past tense. The use of a present perfect should therefore be interpreted as entailing the existence of a specific perfect state at the moment of utterance. The non-existence of the subject of the sentence would render it more difficult to imagine what perfect state there might be. Still, it should be possible, and it has been often pointed out that life-time effects are variable (cf., e.g., Inoue, 1979; Portner, 2003):

(26) a. A: Which Nobel Laureates have visited Princeton?[16]
B: Let's see, Einstein has (visited Princeton), Friedman has, ...
b. Shakespeare has influenced every known author to some extent.

(26) shows that, in a suitable context, life-time effects against the subject of a sentence with a present perfect may simply vanish.

5 Conclusion and Perspectives

In this paper, I have proposed a new approach to the so-called present-perfect puzzle, arguing that it is in fact a part of a bigger problem, namely the cross-linguistic variation of one-step past-referring tenses. I have shown that not only present perfect tenses vary cross-linguistically, but also the simple past tenses these present perfects compete with.

Furthermore, I argued against a core-grammatical (i.e., syntax or compositional semantics) treatment of the present perfect puzzle, presenting data from corpora. I outlined a basically pragmatic solution — supplied by the opposition between a default and a marked tense — to account for the different incompatibilities that arise.

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Double Face Evidentials in German: Reportative 'sollen' and 'wollen' in Embedded Contexts

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Abstract

The evidential (reportative) uses of the German modals *sollen* 'should' and *wollen* 'want' are typically given a purely modal analysis that yields correct predictions for unembedded cases, but fails to account for many embedded occurrences. Based on a corpus and a questionnaire study it is argued that these modals can receive three distinct kinds of interpretation when they occur embedded in clausal complements (partly dependent on the embedding predicate). A revised analysis of reportative *sollen* is offered that involves a reportative presupposition and a conditionally activated assertive component.

1 Introduction

German modal verbs are polyfunctional: They systematically allow for both a circumstantial and an epistemic interpretation. The modals *sollen* 'should' and *wollen* 'want' are special in that they give rise to evidential instead of epistemic readings, in addition to their circumstantial readings. Both indicate that there is reportative evidence for (the truth of) the prejacent proposition. In the case of *sollen* the source of the report is subject-external (as is the source of the obligation in the circumstantial reading), cf. (1). In the case of *wollen* the source is the sentential subject itself (as is the source of the volition in the circumstantial reading), cf. (2).

(1) Anna soll in Oslo sein
Anna should in Oslo be
a. 'Anna should be in Oslo (in view of her obligations)'
b. 'Anna is said to be in Oslo'

(2) Anna will in Oslo sein
Anna want in Oslo be
a. 'Anna wants to be in Oslo'
b. 'Anna claims to be in Oslo'

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In the following, I will concentrate on the reportative use of *sollen* 'should' (henceforth, $sollen_{\text{REP}}$) as illustrated in (1). Almost all of the findings for $sollen_{\text{REP}}$ hold for (the much less frequent) $wollen_{\text{REP}}$ as well, but space restrictions prevent a more detailed discussion here.

2 A standard modal analysis

Intuitively, by uttering $sollen_{\text{REP}}(p)$ a speaker conveys that there is reportative evidence for p. But what does this exactly mean? In order to make this intuition more precise, the following questions are addressed in this section: (a) What exactly is the content of the reportative component? (b) What is the semantic status of this component: truth-conditional or illocutionary? (c) Are additional meaning components conveyed, e.g. reduction or suspension of speaker commitment? The first question is taken up in sec. 2.1, the second in sec. 2.2, the third in sec. 2.3. The discussion results in a preliminary lexical entry for $sollen_{\text{REP}}$ in the final subsection 2.4.

2.1 Characterizing the reportative component

There are various ways to think about and to formally analyze utterances and reports. In a simple case (sufficient for our purposes), an event of reporting involves a speaker, an addressee and a proposition that is conveyed. Like any event, a report is located at some spatiotemporal location (in some possible world). In our simplified setting, a report can be construed as a four-place relation, as in (3-a), abbreviated in (3-b) ('Δ' for 'dicendi').

(3) General form of a report:
   a. x tells y in e that p
   b. $\Delta(e, x, y, p)$

Reports about reports differ in whether both the speaker and the addressee of the reported report are specified as in 'Anna told me that p', or only the addressee as in 'I've heard that p', or only the speaker as in 'Anna said that p'. There are also reports about reports where neither the speaker nor the addressee of the original report is explicitly expressed.[1] A special case are reports about *rumors*, as in 'It is said that p' or 'There are rumors that p'. These are not reports about specific reports, but involve quantification over report events – very roughly, 'There are report events (in some contextually salient spatiotemporal region) that involve members of some (contextually salient) speech community and convey that the proposition p is true'.

This rumor reading seems to be the default interpretation of $sollen_{\text{REP}}$, e.g. in (1). But the reportative component conveyed by $sollen_{\text{REP}}$ is compatible with many other kinds of reports. For example, it can be used to report a specific utterance whose producer

[1] There are many more complex cases conceivable that will not be considered here, e.g. if the current reporter only overheard the original report.

(and/or recipient) is explicitly mentioned, e.g. by an adverbial *laut X* 'according to X', as in (4-a), or anaphorically inferred, as in (4-b).

(4) a. Bea *soll*^{i} laut Anna$_i$ in Oslo sein
Bea should according to Anna in Oslo be
'*Anna said that* Bea is in Oslo'
b. Anna$_i$ hat uns von Bea erzählt. Bea *soll*^{i} in Oslo sein.
'Anna$_i$ told us about Bea. *She$_i$ said that* Bea is in Oslo.'

This being said, I will not be concerned with distinguishing the various types of reported reports in the following. The simplified abstract utterance predicate $\Delta(x, p)$ (roughly, 'x said that p') is sufficient for the purposes of this paper and will be uniformly used to represent the reportative component of *sollen*$_{\text{REP}}$.

2.2 Truth-conditionality

There is a long-lasting and still unresolved debate on whether epistemic modals are truth-conditional, i.e. contribute to the proposition expressed (cf. e.g. Papafragou (2006)). For evidentials like *sollen*$_{\text{REP}}$ the same issue arises. One standard test for truth-conditionality is the so-called »embedding test«, according to which an item is truth-conditional iff it can be semantically embedded in the antecedent of a conditional. When we try to apply the test to *sollen*$_{\text{REP}}$, we find both cases where *sollen*$_{\text{REP}}$ falls within the scope of *wenn* 'if' and hence is truth-conditional, e.g. in (5), and cases where it does not fall within the scope of *wenn* and hence qualifies as »non-truth-conditional«, e.g. in (6) (cf. Faller (2006) for similar examples). In the consulted corpora (cf. sec. 3.1), the latter cases are much more frequent, but there are also many cases that allow for both a truth-conditional and a non-truth-conditional reading.

(5) a. Wenn es morgen regnen *soll*, müssen wir die Fahrräder abdecken
'If *it is said that* it is going to rain tomorrow, we have to cover the bicycles'
b. Ich habe es nicht gerne, wenn es hinterher nur einer gewesen sein *soll*[2]
'I don't like it, if afterwards *it is said that* it has been only one'

(6) a. Wenn Herr Schröder das gesagt haben *soll*, dann müßte er die Konsequenz daraus ziehen und sagen ...[3]
'If Mr. Schröder said this (*as it is alleged*), he should draw the consequence and say ...'
b. Die Dame müßte mindestens um zehn Jahre älter sein, als sie [tatsächlich] ist, wenn sie zu dem Bilde Modell gestanden haben *soll*.[4]
'The woman would have to be at least ten years older than she actually is, if she had acted as a model for this painting (*as it is alleged*)'

[2] *Berliner Zeitung*, 02.07.2003, p.23.
[3] *Die ZEIT* 32/1985.
[4] *Vossische Zeitung (Morgen-Ausgabe)*, 03.03.1903, p.5-6.

According to the embedding test, *sollen*$_{\text{REP}}$ has both truth-conditional and non-truth-conditional uses.[5] However, it can be argued that the seemingly non-truth-conditional uses in (6) are rather *parenthetical* uses, as their English translation by means of *as*-parentheticals also suggests. Parentheticals fail the embedding test, but they can nevertheless be handled in truth-conditional semantics (cf. e.g. Asher (2000), Potts (2005)). The conclusion is that *sollen*$_{\text{REP}}$ is truth-conditional, but has assertive (non-parenthetical) and parenthetical uses (more on these in section 3.2).

2.3 Speaker commitment

Evidentials are often taken to not only indicate the type of source of evidence, but also a certain (increased or decreased) degree of speaker commitment. Scalar hierarchies have been built that order evidentials according to their strength, i.e. the degree of speaker commitment they convey. A typical example would be 'DIRECT > INFERRED > REPORTED'. Given such a scale, by using a DIRECT evidential marker a speaker indicates a high degree of commitment, whereas using a REPORTED evidential marker would indicate a low degree of commitment. However, these hierarchies are best conceived of as partial orders and as context-dependent, as reflected in the formal model of speaker commitment (changes) recently proposed by Davis et al. (2007).

Turning to *sollen*$_{\text{REP}}$, does it indicate (as part of its lexical meaning) a reduced degree of speaker commitment, or even doubt or skepticism, as is sometimes suggested? Here we can rely on Mortelmans (2000, 136), who showed in a corpus study that, while *sollen*$_{\text{REP}}$ is compatible with speaker skepticism, this usage is in practice very rare (in 5 out of 137 considered cases, only one of which was a declarative clause). In addition, the speaker's skepticism is usually explicitly marked.

We conclude that *sollen*$_{\text{REP}}$ does not lexically encode speaker doubt. Skeptic overtones are pragmatic effects. The shift of responsibility conveyed by *sollen*$_{\text{REP}}$ arises as part of the truth-conditional reportative meaning: The speaker is not committed to the reported proposition, but to the existence of a report of the embedded proposition.

2.4 A standard modal account

There are surprisingly few formal accounts of the evidential readings of German modals, a notable exception being Ehrich (2001). She proposes roughly the following lexical entry for *sollen*$_{\text{REP}}$ (cf. Ehrich (2001, 168)):

(7) $[\![soll]\!]^w = \lambda p.[$ for every world $w'Rw$ in which the claims of x_c in w are true, it holds that $w' \in p]$ (where x_c is understood as the contextually supplied source of the relevant claims)

[5] The type of conditional clause may influence the preferred reading; cf. the distinction between central and peripheral adverbial clauses in Haegeman (2006).

The basic idea behind (7) seems to be that '$sollen_{\text{REP}}(p)$' is equivalent to 'x_c said that p' or, using the abstract utterance predicate introduced in section 2.1, '$\Delta(x_c, p)$'. Framing the analysis in Discourse Representation Theory (DRT), we get the Discourse Representation Structure (DRS) in (8-b) for (8-a), where Δ is understood as a relation between an individual and a DRS. Reportative *wollen* receives a parallel treatment, with the minimal difference that the source of the reported speech act is not a contextually supplied individual or group but rather the sentential subject itself.

(8) a. Anna soll in Oslo sein
'Anna is said to be in Oslo'
b. [a o x: Anna(a), Oslo(o), Δ(x, [: in(a,o)])]

(9) a. Anna will in Oslo sein
'Anna claims to be in Oslo'
b. [a o: Anna(a), Oslo(o), Δ(a, [: in(a,o)])]

This analysis of German reportative modals correctly captures that $sollen_{\text{REP}}$ and $wollen_{\text{REP}}$ are truth-conditional (as noted in section 2.2) and do not indicate a reduced degree of speaker commitment (as noted in section 2.3). Without further assumptions, it predicts that embedded occurrences of $sollen_{\text{REP}}$ are grammatical and receive the same modal interpretation as unembedded occurrences. These predictions will be tested in the following section.

3 Embedded evidentials: Data and generalizations

Evidentials are typically considered to operate at the speech act level and hence to be unembeddable (cf. e.g. Aikhenvald (2004, 8.1.3) for a list of languages that do not allow their evidentials to occur in embedded contexts). However, there are exceptions to this cross-linguistic tendency. Evidentials are embeddable in complement clauses in Tibetan (Garrett, 2001), in Bulgarian (Sauerland and Schenner, 2007) and in German, as shown below. In all of these languages, the embeddability of evidentials is subject to certain restrictions. Reportative evidentials occur most naturally under verba dicendi, but there are additional types of embedding predicates that license evidentials in their complements.

Two questions will guide our investigation of the distribution of embedded $sollen_{\text{REP}}$ in German. First (in sec. 3.1), which embedding predicates license $sollen_{\text{REP}}$ in their complement clauses? Second (in sec. 3.2), how is embedded $sollen_{\text{REP}}$ interpreted?

3.1 The distribution of embedded $sollen_{\text{REP}}$

In order to determine whether $sollen_{\text{REP}}$ can occur in complement clauses, two strategies have been deployed: (a) a corpus study and (b) a questionnaire study. In the corpus study, occurrences of embedded $sollen_{\text{REP}}$ in the IDS and DWDS corpora[6] of written German were identified and collected. In total, about 300 corpus examples of $sollen_{\text{REP}}$

[6]For the IDS corpora (DeReKo) cf. http://www.ids-mannheim.de/kl/projekte/korpora/, for the DWDS corpora cf. http://www.dwds.de/.

in complement clauses of 160 different complement-taking predicates were considered. Some typical matrix predicates are listed in (10) in order of decreasing frequency:

(10) *bekannt sein* ('to be known') (9%), *kaum/schwer (zu) glauben* ('hard to believe') and *nicht glauben können* ('cannot believe') (7%), *berichten* ('to report') (6,5%), *es heißt* ('they say') (3%), *schwer vorzustellen* ('hard to imagine') (3%), *behaupten* ('to claim') (2,5%), *erfahren* ('to find out') (2,5%), *hören* ('to hear') (2,5%), *abstreiten* ('to deny') and *leugnen* ('to deny') (2,5%), *dementieren* ('to deny') (2%), *wissen* ('to know') (2%), *kolportieren* ('to hawk') (1,5%), *erzählen* ('to tell') (1,5%), *lesen* ('to read') (1%), *sagen* ('to say') (1%), *bezweifeln* ('to doubt') (1%), *unwahrscheinlich sein* ('to be unlikely') (1%)

In addition, a questionnaire study was conducted. 18 native speakers of German were asked to rank the acceptability of a total of 25 test sentences on a scale ranging from 1 (totally unacceptable) to 5 (perfect). The main goals were to confirm the results of the corpus study and to identify matrix predicates that do *not* allow for embedded $sollen_{\text{REP}}$. The main results are summarized in (11), where the matrix predicates are grouped according to the mean acceptability value of sentences with $sollen_{\text{REP}}$ in their complement clauses.

(11) a. 5-4: *hören* ('to hear'), *seltsam sein* ('to be odd'), *sagen* ('to say'), *lesen* ('to read'), *erzählen* ('to tell'), *erinnern* ('to remember'), *entdecken* ('to discover')
b. 4-3: *interessant sein* ('to be interesting'), *wissen* ('to know'), *bedauern* ('to regret')
c. 3-2: *glauben* ('to believe'), *träumen* ('to dream'), *fühlen* ('to feel'), *Hinweise geben* ('there be indications'), *bezweifeln* ('to doubt'), *lügen* ('to lie')
d. 2-1: *möglich sein* ('to be possible'), *überzeugt sein* ('to be convinced'), *wünschen* ('to wish'), *vermuten* ('to suppose'), *hoffen* ('to hope'), *befürchten* ('to fear'), *beobachten* ('to observe')

The results of the corpus study and the questionnaire study match in the following sense: The predicates that frequently occurred with embedded $sollen_{\text{REP}}$ in the corpora received a high acceptability rank in the questionnaire study (e.g. *hören* 'to hear'), while low ranked predicates did not occur in the corpora at all (e.g. *hoffen* 'to hope'). The lists in (12) and (13) summarize and tentatively systematize these findings by grouping the relevant predicates.

(12) Predicates that allow $sollen_{\text{REP}}$ in their complement clause
a. speech/text production (utterance) predicates: e.g. *behaupten* ('to claim'), *erzählen* ('to tell'), *berichten* ('to report'), *kolportieren* ('to hawk')
b. speech/text perception predicates: e.g. *hören* ('to hear'), *lesen* ('to read')
c. epistemic (semi-)factives: e.g. *wissen* ('to know'), *bekannt sein/werden* ('to be/become known'), *erfahren* ('to find out'), *erinnern* ('to remember')

d. emotive (semi-)factives: *interessant sein* ('to be interesting'), *seltsam sein* ('to be odd'), *bedauern* ('to regret')
e. negative utterance (denial) predicates: e.g. *abstreiten* ('to deny'), *leugnen* ('to deny')
f. negative epistemic predicates: e.g. *kaum/schwer zu glauben* ('hard to believe'), *nicht glauben können* ('to cannot believe'), *bezweifeln* ('to doubt')

(13) Predicates that do not (or only marginally) allow $sollen_{\text{REP}}$ in their complement clause

a. direct perception predicates: e.g. *beobachten* ('to observe'), *fühlen* ('to feel')
b. desire predicates: e.g. *wünschen* ('to wish'), *hoffen* ('to hope')
c. (non-factive, positive) epistemic predicates: e.g. *glauben* ('to believe'), *vermuten* ('to suppose'), *überzeugt sein* ('to be convinced')
d. (non-factive) emotive predicates: e.g. *befürchten* ('to fear')
e. predicates of (low positive) likelihood: e.g. *möglich sein* ('to be possible')

It is a non-trivial task to identify necessary and sufficient conditions for the embeddability of $sollen_{\text{REP}}$, given the heterogeneity of the licensing predicates in (12). However, we can identify three main groups that might allow embedded $sollen_{\text{REP}}$ for different reasons (see below):

(14) a. communication predicates
b. (semi-)factive predicates
c. negative (denial/doubt) predicates

It is clear that the set of predicates that license embedded $sollen_{\text{REP}}$ is distinct from the set of predicates that license embedded root phenomena, e.g. verb-second (V2) complement clauses in German. There are both predicates that allow embedded V2 but not $sollen_{\text{REP}}$ (e.g. *befürchten* 'to fear') and predicates that allow embedded $sollen_{\text{REP}}$ but not V2 (e.g. *interessant sein* 'to be interesting'). However, there is some kind of interaction. It has been argued that an embedded clause can have V2 order if and only if the containing sentence can be used in such a way that the embedded clause constitutes the main point of utterance (cf. Bentzen et al. (2007)). In such cases, where the embedding predicate is used parenthetically, $sollen_{\text{REP}}$ can even occur in complement clauses of predicates in (13), especially non-factive epistemic and emotive predicates like *glauben* 'to believe' or *befürchten* 'to fear', as illustrated in (15-a) and (15-b).

(15) (Anna does not want to meet Charly at the party today, and Bea knows this. Anna asks Bea, whether Charly will come. Bea answers:)

a. Ich glaube/befürchte, Charly *soll* kommen
I think/fear Charly should come
b. Charly *soll* kommen, glaube/befürchte ich
Charly should come think/fear I
'I think / I'm afraid *it is said that* Charly will come'

This does not show that we should add these predicates to the list of *sollen*$_{\text{REP}}$ licensers. It rather shows that *sollen*$_{\text{REP}}$ occurs in (15-a) and (15-b) essentially unembedded. To conclude, the parenthetical use of matrix clauses can render *sollen*$_{\text{REP}}$ acceptable under certain predicates in (13) that allow for such a use.

3.2 The meanings of embedded *sollen*$_{\text{REP}}$

In the previous subsection it was shown that *sollen*$_{\text{REP}}$ can occur in complement clauses of a number of embedding predicates. But how is embedded *sollen*$_{\text{REP}}$ interpreted? In order to answer this question, all of the corpus examples were semantically evaluated and categorized, which often required a closer inspection of the broader linguistic context. As a result, the following three kinds of reading have been identified:

(16) a. A type reading: assertive (non-parenthetical, truth-conditional)
b. G type reading: global (parenthetical, non-truth-conditional)
c. C type reading: concord

The *A type reading (assertive)* is the one that the standard semantics for *sollen*$_{\text{REP}}$ in section 2.4 predicts: *sollen*$_{\text{REP}}(p)$ simply means 'it is said that p'. However, in embedded contexts this reading is surprisingly infrequent. While, by introspection, many corpus examples are in principle compatible with an assertive reading, this interpretation is in most cases contextually clearly dispreferred. There are three factors that seem to favor an assertive reading: (a) if the embedding predicate is used parenthetically (cf. (15) above), (b) if the embedding predicate is factive and/or the embedded clause discourse-old or even echoic (cf. (17-a)), and (c) if the embedded clause is an indirect question (cf. (17-b)). A real life example is given in (18).

(17) a. A: Anna *soll* in Oslo sein
'*It is said that* Anna is in Oslo'
B: Ich weiß, dass Anna in Oslo sein *soll*
'I know that *it is said that* Anna is in Oslo'
b. Anna fragte, ob Charly zur Party kommen *soll*
'Anna asked whether *it is said that* Charly is coming to the party'

(18) 90 mal 190 Zentimeter: Das waren die Abmessungen von Goethes bescheidenem Bett. Auf den Betrachter wirkt es heute ziemlich kurz, vor allem wenn er weiß, dass Goethe groß von Statur gewesen sein *soll*.[7]
'90 x 190 cm: That was the size of Goethe's humble bed. To the beholder it seems quite short today, especially if they know that *it is said that* Goethe had been tall'

The *C type reading (concord)* of *sollen*$_{\text{REP}}(p)$ is simply p, provided that it is embedded under a communication predicate. The existence of this very frequent reading, illustrated

[7] *Die ZEIT* 11/2004: »Wie man in Deutschland schläft und träumt«.

in (19), has been noted before by Letnes (1997). While an A type reading is in principle available for these sentences, it is contextually strongly dispreferred. For example, the author of (19-a) clearly didn't intend to express that the newspaper had wrongly claimed that *it was said that* the princess gained her peerage dishonestly.

(19) a. Die Zeitschrift hatte fälschlicherweise behauptet, daß sich die Prinzessin ihren Adelstitel unredlich erworben haben *soll*[8]
'The newspaper had wrongly claimed that the princess gained her peerage dishonestly'

b. Es ist irgendwie kindisch, daß gleich behauptet wird, daß MS dahinterstecken *soll*[9]
'It is somehow childish that it is immediately claimed that MS is behind it'

The *G type reading (global)* of embedded $sollen_{\text{REP}}(p)$ can best be paraphrased by a parenthetical construction: 'p, as it is alleged'. Albeit its availability is somewhat unexpected, this type of reading is quite pervasive in all of the corpora that have been looked at. Some examples are given in (20). The term 'non-truth-conditional' for this reading is somewhat misleading and will be avoided in the following, but has been mentioned, because $sollen_{\text{REP}}$ in the G type reading fails the well-known embedding test for truth-conditionality, as mentioned in sec. 2.2.

(20) a. Daß er dem Schüler auch auf den Kopf geschlagen haben *soll*, streitet der Lehrer entschieden ab.[10]
'The teacher resolutely denies that he hit the pupil also on the head *(as it is alleged)*'

b. Daß es in ganz China im Vorjahr "nur" etwas mehr als 60.000 Verkehrstote gegeben haben *soll*, erscheint angesichts dieser rauhen Sitten wie ein Wunder.[11]
'In view of these tough customs it seems like a miracle that there were "only" slightly more than 60.000 traffic deaths in China last year (*as it is alleged*)'

c. Daß Legrenzi sein Lehrer gewesen sein *soll*, ist unwahrscheinlich[12]
'That Legrenzi had been his teacher (*as it is alleged*), is unlikely'

d. Es ist schwer zu glauben, dass ich der Vater Deines Kindes sein *soll*.[13]
'It is hard to believe that I am the father of your child (*as it is alleged*)'

To summarize, embedded $sollen_{\text{REP}}$ can be used in the following three ways (where 'CTP' stands for the complement taking predicate that embeds $sollen_{\text{REP}}$):[14]

[8] *Die Presse*, 19.12.1992.
[9] http://www.pro-linux.de/news/2002/4353.html, accessed 04.04.2007.
[10] *Salzburger Nachrichten*, 18.01.1997.
[11] *Salzburger Nachrichten*, 26.11.1994.
[12] *Salzburger Nachrichten*, 27.07.1991.
[13] *Berliner Zeitung*, 07.06.2005, p.17.
[14] If '$\text{CTP}(p)$' entails '$\Delta(p)$', the G and C readings coincide. However, C readings cannot be reduced to G readings in general. The C reading of the following example (Uli Sauerland, p.c.) does not entail that somebody claimed or wrote that the princess is a fraud: *Keine Zeitung hat geschrieben, dass die*

(21)

	Readings of CTP($sollen_{\text{REP}}(p)$)		typical environment
a.	A (assertive)	CTP($\Delta(p)$)	unembedded, under (semi-)factives
b.	G (global)	$\Delta(p) \wedge$ CTP(p)	under negative (doubt/denial) predicates
c.	C (concord)	CTP(p)	under communication predicates

The contextually preferred type of reading depends on a variety of factors, the probably most important being the type of the embedding predicate. Even the few examples given above suggest that there are correlations between the type of the matrix predicate and the available readings of embedded $sollen_{\text{REP}}$. The three main types of $sollen_{\text{REP}}$ licensing predicates listed in (14) seem to be associated with the three types of reading distinguished in (16) as indicated in (21). The unembedded use of $sollen_{\text{REP}}$ patterns with the embedding under (semi-)factives.

4 Analysis revisited

The semantics of $sollen_{\text{REP}}$ introduced in section 2.4 wrongly assigns the A type (assertive) reading to all occurrences of $sollen_{\text{REP}}$. There are two main options for revising the analysis: (a) an *ambiguity* analysis that treats $sollen_{\text{REP}}$ as lexically ambiguous between A/G/C readings, and (b) a *non-ambiguity* analysis where the various readings of $sollen_{\text{REP}}$ are derived from a single lexical entry. These two options are explored in the following subsections.

4.1 Ambiguity analysis

One way to account for the additional readings of embedded $sollen_{\text{REP}}$ is to argue that it is lexically ambiguous between the standard semantics stated in section 2.4, a concord and a parenthetical reading. In the latter reading, the reportative component is not added to the local DRS, but to the global DRS. Informally stated and ignoring concord readings for the moment, we get the following two entries for $sollen_{\text{REP}}$:

(22)
a. $sollen_{\text{REP:1}}(p)$: add the condition '$\Delta(x_c, p)$' to the local DRS
b. $sollen_{\text{REP:2}}(p)$: add the condition p to the local DRS and the condition $\Delta(x_c, p)$ to the global DRS

For example, using $sollen_{\text{REP:1}}$ we can derive the A reading of (23-a), shown in (23-b), and using $sollen_{\text{REP:2}}$ we can derive the G reading, shown in (23-c).

(23)
a. Bea sagt/weiß, dass Anna in Oslo sein *soll*
Bea says/knows that Anna in Oslo be should
b. [a b o: Anna(a), Bea(b), Oslo(o), say/know(b,[x: Δ(x,[: in(a,o)])])]
c. [a b o x: Anna(a), Bea(b), Oslo(o), say/know(b,[:in(a,o)]), Δ(x,[:in(a,o)])]

Prinzessin eine Betrügerin sein soll 'No newspaper wrote that the princess is a fraud'.

There are other ways of implementing the basic idea that $sollen_{\text{REP}}$ has a non-parenthetical and a parenthetical reading, depending on one's favorite theory of supplements. For example, using the multidimensional framework of Potts (2005), we could replace (22) by (24).

(24) a. $sollen_{\text{REP:1}} \rightsquigarrow \lambda p \lambda x_c \lambda w.[\Delta(p)(x_c)(w)] : \langle \langle s^a, t^a \rangle, \langle e^a, \langle s^a, t^a \rangle \rangle \rangle$
b. $sollen_{\text{REP:2}} \rightsquigarrow \lambda p \lambda x_c \lambda w.[\Delta(p)(x_c)(w)] : \langle \langle s^a, t^a \rangle, \langle e^a, \langle s^a, t^c \rangle \rangle \rangle$

The difference between (24-a) and (24-b) is that the assertive (non-parenthetical) entry (24-a) contributes the reportative component to the at-issue content, while the parenthetical entry (24-b) contributes it as a conventional implicature in the sense of Potts (2005).

No matter what version, the ambiguity approach suffers from several problems. Without further assumptions, it radically overgenerates in two cases. First, it does not predict that (and hence cannot explain why) $sollen_{\text{REP:1}}$ cannot be embedded in many (especially non-factive) contexts. Second, it does not predict that $sollen_{\text{REP:2}}$ cannot be used in matrix clauses. Of course, we could come up with some principles that restrict possible disambiguations of $sollen_{\text{REP}}$, e.g. along the lines in (25).

(25) a. Do not commit the speaker to p, if she uttered '$\ldots sollen_{\text{REP}}(p) \ldots$'
b. Prefer the strongest meaning, i.e. prefer $sollen_{\text{REP:2}}$ to $sollen_{\text{REP:1}}$

However, this line of thought will not be pursued in this paper, since there is an additional reason to disfavor the ambiguity approach. By economy considerations, a non-ambiguity approach that does not require a duplication of lexical entries is to be preferred over the ambiguity approach. Hence we shift our endeavors to developing a non-ambiguity account of $sollen_{\text{REP}}$ in section 4.2.

4.2 Non-ambiguity analysis: A presuppositional account

If we want a single entry for $sollen_{\text{REP}}$, its meaning has to be, in a sense, positionally flexible, since the reportative component conveyed by $sollen_{\text{REP}}$ sometimes seems to be contributed to the local DRS, sometimes to the global DRS. This kind of flexibility is reminiscent of the projection behavior of presuppositions, »agile creatures eager to leave their homes« (Geurts, 1999, 114). In presuppositional DRT, DRSes are constructed in two steps. First, a *preliminary DRS* for a sentence is built based on the lexical meanings of its parts. Presuppositions are explicitly represented where they are triggered. Second, the sentence is put in context, its presuppositions are resolved, ultimately leading to the *final DRS* of the sentence. There are two basic options for the resolution of presuppositions: Binding, as in (26-a), and accommodation, where we can further (minimally) distinguish between global (non-local) accommodation as in (26-b) and local (non-global) accommodation as in (26-c) (cf. e.g. Geurts (1999)).

(26) a. If Anna owns a cat, Anna's cat is black
b. If Anna's cat is black, she must be happy
c. Either Anna doesn't have a cat or Anna's cat is in hiding

The basic idea of our non-ambiguity analysis of *sollen*$_{\text{REP}}$ is that it triggers a reportative presupposition '$\Delta(x_c, p)$'. It turns out that the three readings of (embedded) *sollen*$_{\text{REP}}$ correspond to the three basic projection possibilities of this presupposition:

(27)

type of reading	resolution	configuration	typical environments
A (assertive)	local accomm.	$[\textsc{ctp}](\Delta(x_c, p))$	unembedded, under *know*
G (global)	global accomm.	$\Delta(x_c, p) \wedge \textsc{ctp}(p)$	under *doubt*
C (concord)	binding	$\textsc{ctp}(p)$	under *say*

There is one complication: In the G reading of *sollen*$_{\text{REP}}(p)$, the proposition p plays a double role, i.e. it is used twice in the semantic representation.[15] The proposed semantics of *sollen*$_{\text{REP}}$ (somewhat simplified: extensional and ignoring tense) is stated in (28). It consists of two parts: (a) a reportative presupposition, (b) an assertive part that is only activated if the resolution of the reportative presupposition violates local informativity. (The second part is required for deriving the G reading, as shown below.)

(28) *sollen*$_{\text{REP}}(p)$: (a) $\partial[x_c \mid \Delta(x_c, p)]$
(b) p, if the resolution of (a) violates local informativity

The idea that evidential expressions contribute a presupposition is not new (cf. e.g. Izvorski (1997)).[16] However, as will become clear in a moment, the presupposition of *sollen*$_{\text{REP}}$ in (a) does not behave exactly like a run-of-the-mill presupposition (if there is such a thing). More specifically, the projection profile of the *sollen*$_{\text{REP}}$ presupposition features a *low accommodation threshold* (thus the possibility of binding does not strictly exclude the possibility of accommodation). The second component in the semantics of *sollen*$_{\text{REP}}$ in (28) is an instantiation of the idea that an expression has to have some effect on its local DRS (local informativity). This condition is violated, for example, if the reportative presupposition of *sollen*$_{\text{REP}}(p)$ is non-locally accommodated. In such a case, local informativity is rescued by adding p to the local DRS (stripping off *sollen*$_{\text{REP}}$).

Let's look at some applications.[17] The simplest cases are occurrences of unembedded *sollen*$_{\text{REP}}$, as in (29-a). Since binding is not an option here, the reportative component has to be accommodated in the local (= global) DRS, satisfying local informativity.

[15] This double usage is typical for supplemental expressions; cf. Potts (2005) for discussion.

[16] There is a conceptual problem with this idea: A core characteristic of presuppositions is that they are »taken for granted« – but evidential presuppositions typically are not (cf. Matthewson et al. (2007, 36) for discussion). We will stick to the term 'presupposition' here, but use it in a technical sense for elements that can project.

[17] In the following examples, presupposed material is underlined, conditionally activated material is in italics.

(29) a. Bea *soll* in Oslo sein
Bea should in Oslo be
'*It is said that* Bea is in Oslo'
b. [b o x: Bea(b), Oslo(o), Δ(x,[: in(b,o)]), *in(b,o)*]
c. [b o x: Bea(b), Oslo(o), Δ(x,[: in(b,o)])]

If *sollen*$_{\text{REP}}$ is embedded under an utterance predicate, as in (30-a), its reportative presupposition can be bound to it. The presence of the conditionally activated complement of *sollen*$_{\text{REP}}$ might facilitate this process which results in the concord interpretation in (30-c).

(30) a. Anna sagt dass Bea in Oslo sein *soll*
Anna says that Bea in Oslo be should
'Anna says that Bea is in Oslo'
b. [a b o: Anna(a), Bea(b), Oslo(o), say(a,[x: Δ(x,[: in(b,o)]), *in(b,o)*])]
c. [a b o: Anna(a), Bea(b), Oslo(o), say(a,[: in(b,o)])]

If the reportative presupposition cannot be bound, global accommodation is the preferred option, as illustrated in (31-a). Since global accommodation is non-local here (in contrast to (29-a)), local informativity is violated in (31-c), which triggers the (b) component in (28). The resulting DRS in (31-d) correctly captures the interpretation of (31-a).

(31) a. Es ist schwer zu glauben dass Bea in Oslo sein *soll*
It is hard to believe that Bea in Oslo be should
'It is hard to believe that Bea is in Oslo (as it is alleged)'
b. [b o: Bea(b), Oslo(o), hard-to-believe([x: Δ(x,[: in(b,o)]), *in(b,o)*])]
c. [b o x: Bea(b), Oslo(o), hard-to-believe([: *in(b,o)*]), Δ(x,[: in(b,o)])]
d. [b o x: Bea(b), Oslo(o), hard-to-believe([: in(b,o)]), Δ(x,[: in(b,o)])]

If *sollen*$_{\text{REP}}$ occurs in embedded contexts, local accommodation is also an option, albeit usually a dispreferred one (cf. section 3.2). For example, (30-a), repeated as (32-a), can get the interpretation in (32-c), if local accommodation is enforced.

(32) a. Anna sagt dass Bea in Oslo sein *soll*
Anna says that Bea in Oslo be should
'Anna says that *it is said that* Bea is in Oslo'
b. [a b o: Anna(a), Bea(b), Oslo(o), say(a,[x: Δ(x,[: in(b,o)]), *in(b,o)*])]
c. [a b o: Anna(a), Bea(b), Oslo(o), say(a,[x: Δ(x,[: in(b,o)])])]

In section 3.2 it was noted that (semi-)factive predicates seem to favor local accommodation readings. If we assume that presuppositions are resolved bottom-up, i.e. presuppositions of deeper embedded triggers are resolved prior to presuppositions of higher triggers, then we might be able to explain this finding. For example, semifactive *wissen* 'know' presupposes that its clausal complement is true. But the content of its complement in

(33-a) depends (assuming bottom-up resolution) on the resolution of the presupposition of $sollen_{\text{REP}}$. If the presupposition of $sollen_{\text{REP}}(p)$ were accommodated globally, the complement of *wissen* and hence a presupposition of the sentence would be p, as shown in (33-b). But this would render the contribution of $sollen_{\text{REP}}$ superfluous. By contrast, if the presupposition of $sollen_{\text{REP}}$ is accommodated locally, we get the sensible interpretation in (33-c): »It is said that Bea is in Oslo and Anna knows that«.

(33) a. Anna weiß dass Bea in Oslo sein *soll*
Anna knows that Bea in Oslo be should
b. [a b o x: A.(a), B.(b), O.(o), know(a,[: in(b,o)]), Δ(x,[: in(b,o)]), in(b,o)]
c. [a b o x: A.(a), B.(b), O.(o), know(a,[y: Δ(y,[: in(b,o)])]), Δ(x,[: in(b,o)])]

5 Conclusion

The German modal *sollen* 'should' in its reportative use is truth-conditional (cf. sec. 2.2) and does not lexically encode a reduced degree of speaker commitment (cf. sec. 2.3). It has been shown that $sollen_{\text{REP}}$ can be embedded in complement clauses of at least three classes of embedding predicates: communication predicates, (semi-)factive predicates and certain negative (denial/doubt) predicates. Embedded occurrences of $sollen_{\text{REP}}$ can have one of three readings that have been labeled A (assertive), G (global) and C (concord).

The availability of G and C readings are problematic for standard accounts of $sollen_{\text{REP}}$ and necessitate a more fine-grained analysis. In section 4, two proposals have been considered that are capable of deriving the additional readings. While the non-ambiguity approach in section 4.2 is to be favored on conceptual grounds, a further elaboration of both accounts is required before a final decision between them can be made. Two topics that bear on this issue are discussed in Schenner (2008): First, a comparative analysis of the reportative subjunctive, another grammaticalized reportative strategy in German (cf. Fabricius-Hansen and Sæbø (2004)), that accounts for both the similarities and the differences to $sollen_{\text{REP}}$. Second, an analysis of the interaction of multiple reportative strategies in a single sentence that is capable of correctly predicting the availability of evidential concord readings.

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"Eigentlich" again *

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Abstract

Experimental data on the interpretation of the German adverb "eigentlich" are presented. The formal account of Schmitz and Schröder (2004) to the explanation of these data is discussed and substantially modified. We arrive at an improved account that makes use of the integration of pragmatic operations of meaning enrichment into compositional semantics.

1 "Eigentlich": some observations

The German word "eigentlich" can be used as an adverb, an adjective or a discourse particle. The adverb, the adjective and the particle are etymologically and semantically related. Here, I focus on the adverb, in particular the sentence-modifying adverb. Sentences with the adverb modifying non-sentential expressions, like (1-a), can be paraphrased by sentences in which the adverb modifies a sentence, like (1-b). Moreover, sentences in which the adjective is used as an attribute, like (1-c), can be paraphrased by sentences in which "eigentlich' only occurs as an adverb, like (1-d). The predicative use of the adjective is very unusual. Example (1-e) seems to be impossible in ordinary German. I found only one occurrence of a predicative "eigentlich", at the beginning of Adorno's *Jargon der Eigentlichkeit* (example (1-f)).

(1) a. Dies ist ein eigentlich schwieriges Problem.
(This is an actually difficult problem.)
b. Dies ist ein Problem, das eigentlich schwierig ist.
(This is a problem which actually is difficult.)
c. Dies ist das eigentliche Problem. *(This is the real problem.)*
d. Dies ist eigentlich das Problem. *(Actually, this is the problem.)*
e. ?? Dieses Problem ist eigentlich. *(This problem is eigentlich.)*

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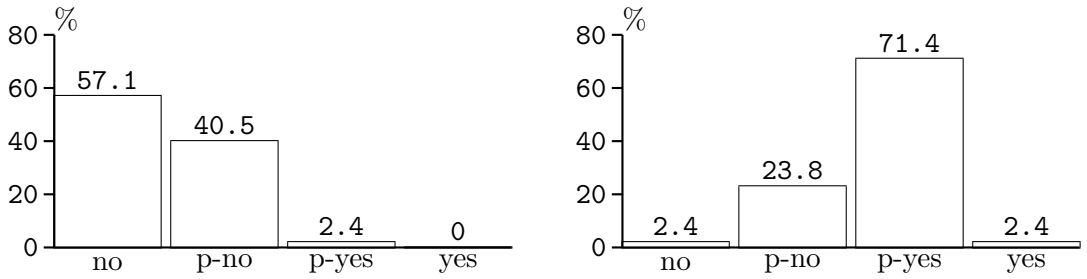


(a) I have to finish my paper. (b) Eigentlich, I have to finish my paper.

Figure 1: Experiment: interpretation of example (2)

f. "Ein Freund, den die Sphäre damals anzog, wurde zu seinem leisen Verdruß nicht eingeladen. Er sei, so bedeutete man ihm, nicht eigentlich genug." *(... He was given to understand that he was not authentic (eigentlich) enough.)* (Adorno (1964))

Although "eigentlich" is used frequently and speakers of German seem to naturally understand it, there is disagreement on its meaning. Some linguists claim that it marks the most relevant, very important and essential (e.g. Weydt and Hentschel (1983)); others state that it marks the not so relevant and less important (e.g. Kohrt (1988)). The adverb "eigentlich" is best translated as "actually". Note, that this translation is only an approximation; my claims on the meaning of "eigentlich" are not claims on the meanings of translations of "eigentlich".

Let us take a look at an example which I consider to be paradigmatic for the use of adverbial "eigentlich":[1]

(2) A: Kommst Du mit Essen? *(Shall we go out for lunch?)*

a. B: Ich muss meinen Artikel fertig schreiben.
(I have to finish my paper.)

b. B: Eigentlich muss ich meinen Artikel fertig schreiben.
(Eigentlich, I have to finish my paper.)

In an experiment, 42 test subjects – 26 native speakers and 16 non-native speakers of German[2] – were asked to interpret B's answers and choose one of the following options:

- B will not go out for lunch with A. (no)
- Presumably, B will not go out for lunch with A. (p-no)
- Presumably, B will go out for lunch with A. (p-yes)
- B will go out for lunch with A. (yes)

[1] An investigation of the Limas corpus and the Verbmobil corpus supports the view that this is a paradigmatic example. Cf. Schmitz and Schröder (2004).

[2] All test subjects of this and the other experiments described in this paper were first-year students in linguistics at the University of Bonn or the University of Frankfurt.

The results of the experiment are depicted in Figures 1(a) and 1(b). After perceiving answer (2-a) (without "eigentlich"), nearly all subjects expected that B will not go out for lunch or will presumably not go out for lunch with A (Figure 1(a)). This expectation can be explained along the following line: The subjects presupposed the default rule that, normally, if someone has to finish a paper then he will not go out for lunch. B says that he has to finish a paper. There is no evidence against the applicability of the default rule. The subjects therefore conclude that B will (presumably) not go out for lunch.

Answer (2-b) led to different expectations: more than 2/3 of the subjects expected that B presumably *will* join A for lunch (Figure 1(b)). The answers (2-a) and (2-b) led to different expectations regarding what B will do. Since the answers differ only in the occurrence of "eigentlich", the change of expectations must be an effect of "eigentlich".

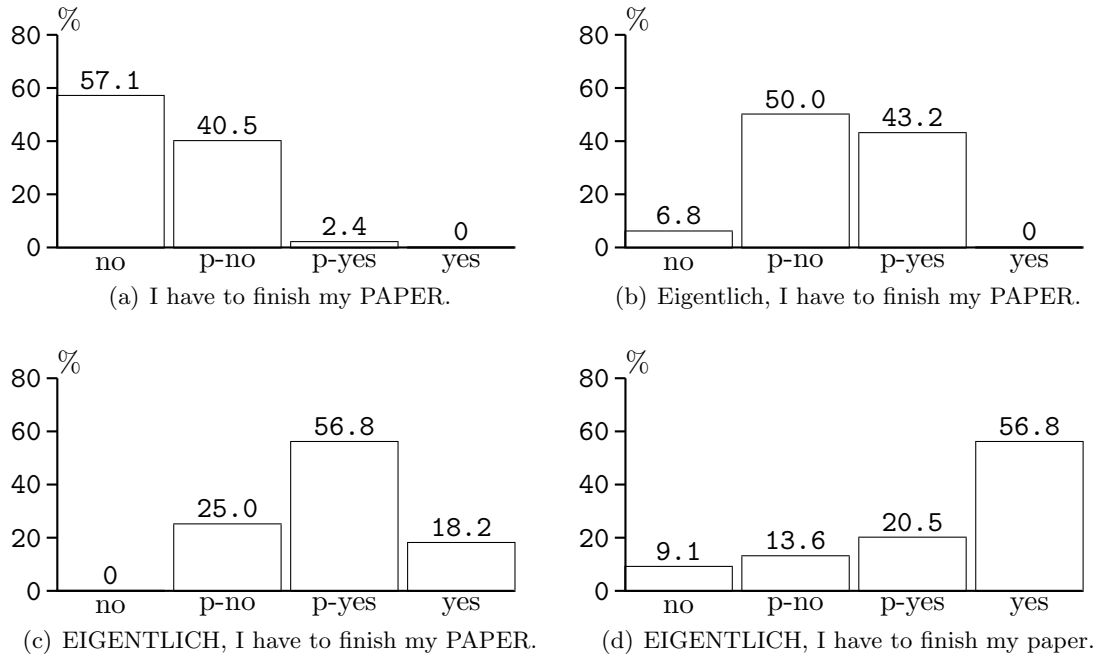
In example (2), B is not only asked to transfer information but also to commit himself to an action, namely to go out for lunch or not. Does that have an influence on the test subjects' interpretations? – I repeated the experiment with example (3) and 39 subjects, all of them native speakers of German:

(3) A: Kommt Thomas mit essen? *(Does Thomas join us for lunch?)*
   a. B: Er muss seinen Artikel fertig schreiben.
   (He has to finish his paper.)
   b. B: Eigentlich muss er seinen Artikel fertig schreiben.
   (Eigentlich, he has to finish his paper.)

After answer (3-a) (without "eigentlich"), 97.4% of the subjects expected that Thomas will (presumably) not go out for lunch. After answer (3-b) (with "eigentlich"), 66.7% of the subjects expected that he will presumably go out for lunch. 10.2% even expected that he will in fact – not only presumably – go. The results are nearly the same as in the first experiment

Are the subjects' expectations somehow affected by the answer's stress pattern? – I repeated the experiment again, this time with example (4) and 44 subjects (all of them native speakers of German). The results are depicted in Figures 2(b)-2(d) (Figure 2(a) is identical to Figure 1(a)). As can be seen, the expectation that B will join A for lunch is correlated with the relative prosodic prominence of "eigentlich".

(4) A: Kommst Du mit essen? *(Shall we go out for lunch?)*
   a. B: Eigentlich muss ich meinen ARTIKEL fertig schreiben.
   (Eigentlich, I have to finish my PAPER.)
   b. B: EIGENTLICH muss ich meinen ARTIKEL fertig schreiben.
   (EIGENTLICH, I have to finish my PAPER.)
   c. B: EIGENTLICH muss ich meinen Artikel fertig schreiben.
   (EIGENTLICH, I have to finish my paper.)



(a) I have to finish my PAPER.

(b) Eigentlich, I have to finish my PAPER.

(c) EIGENTLICH, I have to finish my PAPER.

(d) EIGENTLICH, I have to finish my paper.

Figure 2: Experiment: interpretation of example (4)

2 "Eigentlich" as a default blocker

In Schmitz and Schröder (2004), Bernhard Schröder and I explained the effect of "eigentlich" on the expectations of the test subjects by making use of Frank Veltman's framework of Defaults in Update Semantics (Veltman (1996)): Let a rather naive information state $0[p \rightsquigarrow \neg q]$ be given which only entails the default rule that if p then normally not q – e.g., if someone has to finish a paper, then normally he will not go out for lunch. An update with p – B has to finish a paper – does not affect the knowledge of this default rule. The updated information state therefore entails p and $p \rightsquigarrow \neg q$. Moreover, the information state entails the default conclusion that presumably not q – e.g., that presumably B will not go out for lunch. Thus, Veltman's framework can be used to explain the interpretation of example (2-a) (the answer without "eigentlich").

$$0[p \rightsquigarrow \neg q][p] \models p \quad (1)$$

$$0[p \rightsquigarrow \neg q][p] \models p \rightsquigarrow \neg q \quad (2)$$

$$0[p \rightsquigarrow \neg q][p] \models \text{presumably } \neg q \quad (3)$$

Within Veltman's framework, we defined "eigentlich" as a default blocker: *Eigentlich* p has the same truth conditions but not the same update potential as p. An update with *eigentlich* p leads to the same modification of the factive knowledge represented by an information state as an update with p. Thus, an information state updated with *eigentlich* p entails p. Moreover, the update does not affect the knowledge of default rules. If the default rule $p \rightsquigarrow \neg q$ is entailed by an information state, then it is still entailed after an update with *eigentlich* p. However, "eigentlich" affects the applicability of default

rules. After an update with *eigentlich p*, *p*-defaults – i.e., default conclusions that could be drawn from *p* and the knowledge of default rules – are not entailed by the information state. This explains why the test subjects did not expect that B will (presumably) not go out for lunch after example (2-b) (the answer with "eigentlich").

$$0[p \rightsquigarrow \neg q][\text{eigentlich } p] \models p \quad (4)$$

$$0[p \rightsquigarrow \neg q][\text{eigentlich } p] \models p \rightsquigarrow \neg q \quad (5)$$

$$0[p \rightsquigarrow \neg q][\text{eigentlich } p] \not\models \text{presumably } \neg q \quad (6)$$

This is not the whole story. After the eigentlich-answer, the test subjects have not just been undecided about B going out for lunch or not. The majority expected that B presumably *will* join A. How can that be explained? – By answering that he *eigentlich* has to finish his paper, B blocks the conclusion that he will presumably *not* go out for lunch and by which he would give a vague answer to A's question. Thus, he does not answer the question under discussion. He must have a reason for blocking the conclusion and not giving an answer. The best reason for blocking the conclusion is that it is false. Presumably, there is some fact which contradicts the default conclusion and which is as relevant for B's decision as the fact that he has to finish his paper. The recipient A (or, in the experiment, the test subjects) can expect that the competing fact is named in a subsequent sentence. Such a sentence is usually introduced with "aber" (*"but"*) and thereby marked as more relevant for the decision (cf. Winter and Rimon (1994)):

(5) Eigentlich muss ich meinen Artikel fertig schreiben, aber ...
(Eigentlich, I have to finish my paper, but ...)

A therefore assumes that B presumably *will* go out for lunch with him. This assumption is a conversational implicature. The implicature can be cancelled; it is possible to continue the answer by stating that one will not go out for lunch:

(6) Eigentlich muss ich meinen Artikel fertig schreiben. Es tut mir leid, ich muss hier bleiben. *(Eigentlich, I have to finish my paper. Sorry, I have to stay here.)*

As we saw in section 1, the implicature is supported by a high prominence of "eigentlich". The implicature can be cancelled more easily – and therefore example (6) sounds better – if "eigentlich" is not stressed.

The account of Schmitz and Schröder (2004) was tested with the occurrences of "eigentlich" in the LIMAS-corpus and the Verbmobil-corpus. It passed the test without a problem. Nevertheless, the account has some drawbacks. Before I come to the discussion of these drawbacks and the modification of the account, I have to make a short excursus.

3 Excursus: meaning enrichment in semantics

In natural language communication, recipients can perform operations of meaning enrichment. A cooperative speaker wants to be understood. He must anticipate possible meaning enrichments which might be carried out by the recipient. A recipient wants to understand the speaker. He can only carry out meaning enrichments that can be anticipated or even be intended by the speaker. It must be clear in advance which meaning enrichment operations can be performed; the set of enrichment operations is restricted. We can take these operations into account when we construct meaning representations for utterances.

(7) A: Wie spät ist es? *(What time is it?)*
B: Es ist 5 nach 3, meine Uhr geht aber 5 Minuten vor.
(It's 5 past 3, but my watch is 5 minutes fast.)

Let us take a look at example (7): 42 test subjects – 26 native speakers of German and 16 non-native speakers of German – were asked to interpret B's answer and to write down what time it is according to the answer. The clear majority of 85.7% assumed that it was 15:00h which is not the literal meaning of B's answer. Only six subjects (14.3%, all of them native German speakers) interpreted the answer literally. I asked the subjects how they arrived at the non-literal interpretation. The explained that they interpreted the answer in the sense of "By my watch it's 5 past 3, but my watch is 5 minutes fast" which entails that it's (exactly) 3 o'clock. I did not invent the example. When I first heard it, I asked the speaker what he meant. He answered that he meant that it was (exactly) 3 o'clock. Thus, the test subjects interpreted the answer correctly.

Further experiments showed that the non-literal interpretation is not dependent on the occurrence of "aber" (*but*); "aber" can be substituted with "und" (*and*) or be left out without a significant change of the results. (Cf. example (12) in section 4.3.)

The subjects identified an NP that denotes a potential information source – the speaker's watch – in the second conjunct of the answer. They transformed the semantic representation of the NP into a modal operator (*by the speaker's watch*). Finally, they applied this operator to the semantic representation of the first conjunct of the answer sentence. The specification of this enrichment operation can be integrated into an extended meaning representation of the answer sentence. In formula 7, an abridged feature structure is used to describe the meaning of the first conjunct of B's answer in example (7). For reasons of readability, the structure includes lambda-expressions. However, it can be easily transformed into a proper HPSG-like feature structure without lambda-expressions. The value of the NORMAL-feature is a representation of the literal meaning of "It's 5 past 3". By the ENRichment-feature possible meaning enrichment operations are specified. Here, only the operation of modal enrichment with the OP-operators is named. Since modal enrichment is not declared to be obligatory, the meaning representation is underspecified. By a function ϕ, we can compute the set of fully specified possible meaning representations of "It's 5 past 3".

$$\{\ \lambda w[\text{it's-5-past-3}](w), \lambda w[\text{by-watch}(\lambda w'[\text{it's-5-past-3}(w')])(w)]\ \} \subseteq$$
$$\phi\left(\begin{bmatrix}\text{NORMAL} & \lambda w[\text{it's-5-past-3}(w)] \\ \text{ENR} & \begin{bmatrix}\text{MODAL} & \begin{bmatrix}\text{OP} & \left\langle \lambda Q \lambda w[\text{by-watch}(Q)(w)],\ ... \right\rangle\end{bmatrix}\end{bmatrix}\end{bmatrix}\right) \quad (7)$$

It might be that in a given situation an operation of meaning enrichment is not obligatory but only optional for the recipient. In such a situation, a speaker cannot be sure whether the recipient will perform this operation or not; and the recipient cannot be sure whether he should perform it or not. In order to assure that he is properly understood, the speaker must control which operations of meaning enrichment are performed by the recipient. I claim that some expressions serve the purpose of controlling meaning enrichment. In German, one of these expressions is the word “tatsächlich” (*in fact*).

(8) A: Wie spät ist es? *(What time is it?)*
B: Tatsächlich ist 5 nach 3, meine Uhr geht aber 5 Minuten vor.
(In fact, it's 5 past 3, but my watch is 5 minutes fast.)

The 42 subjects who were already asked to interpret the answer of example (7) (without “tatsächlich”) were also asked to interpret the answer of example (8) (with “tatsächlich”). This time, 95.2% interpreted the answer literally as meaning that it is 15:05h. Only two subjects (4.8%, both non-native speakers of German) performed an operation of modal enrichment and understood that it was 15:00h. There is a clear correlation of the interpretations and the occurrence of “tatsächlich”; the one-sided t-test yielded a p-value of $3.954 \cdot 10^{-15}$.

“Tatsächlich” does not change the literal meaning of B's answer – “Es ist 5 nach 3” (*It's 5 past 3*) and “Tatsächlich ist es 5 nach 3” (*In fact, it's 5 past 3*) have, literally interpreted, the same truth conditions. However, “tatsächlich” evidently blocks the creation of a modal interpretation context. That is, it influences the applicability of an enrichment operation. This role can be easily specified by the addition of an APPLication-feature to the feature structure proposed above:

$$\lambda w[\text{it's-5-past-3}](w) \in$$
$$\lambda w[\text{by-watch}(\lambda w'[\text{it's-5-past-3}(w')])(w)] \notin$$
$$\phi\left(\begin{bmatrix}\text{NORMAL} & \lambda w[\text{it's-5-past-3}(w)] \\ \text{ENR} & \begin{bmatrix}\text{MODAL} & \begin{bmatrix}\text{OP} & \left\langle \lambda Q \lambda w[\text{by-watch}(Q)(w)],\ ... \right\rangle \\ \text{APPL} & \text{blocked}\end{bmatrix}\end{bmatrix}\end{bmatrix}\right) \quad (8)$$

Let me take stock: meaning enrichment operations must be conventionalised, they can be specified within extended meaning representations, and there are expressions which

are used to control meaning enrichments, i.e. there are expressions which refer to the applicability of conventionalised meaning enrichment operations.[3]

Let us come back to "eigentlich".

4 "Eigentlich" as an enrichment blocker

4.1 Blocking modal strengthening of default conclusions

After interpreting example (2-a) – B's answer without "eigentlich" – 40.5% of the test subjects expected that B will *presumably* not go out for lunch (p-no) and 57.1% of the subjects expected that B will *(in fact)* not go out for lunch (no). The data reveal that nearly all subjects have a negative expectation of B's going out for lunch. It might be that the subjects chose between the negative expectations *no* or *p-no* by chance. Therefore, the data do not justify a hypothesis according to which the subjects followed different interpretation strategies which led to the different expectations that B will *presumably* not go or that B will *in fact* not go. Let us nevertheless tentatively explore the idea that the subjects followed different interpretation strategies and see where it leads us: all subjects with a negative expectation drew the default conclusion that B will presumably not go out for lunch (*presumably* $\neg q$). More than half of these subjects also performed an operation of meaning enrichment by transforming this conclusion from *presumably* $\neg q$ to $\neg q$. I call this operation *modal strengthening of a default conclusion* (MSDC). It can be defined as follows:

Definition 1 *Be σ an information state and be ϕ a proposition. Modal strengthening of a default conclusion (MSDC) is performed after an update of σ with ϕ iff $\sigma[\phi]$ is updated with some proposition ψ for which it holds that (i) $\sigma \not\models$ presumably ψ, (ii) $\sigma[\phi] \models$ presumably ψ, and (iii) $\sigma[\phi] \not\models \psi$.*[4]

It is now possible to define "eigentlich" similar to "tatsächlich" as an enrichment blocker. "Eigentlich" does not block default conclusions but only their modal strengthening. This role can be specified by inserting an MSDC-feature into a feature structure of the kind introduced in section 3 and by assigning the APPLication-feature the value "blocked". Accordingly, the feature structure 9 is an abridged meaning representation of "Eigentlich muss ich meinen Artikel fertig schreiben" *(Eigentlich, I have to finish my paper)*:

$$\begin{bmatrix} \text{NORMAL} & \lambda w[\text{i-have-to-finish-my-paper}(w)] \\ \text{ENR} & \begin{bmatrix} \text{MSDC} & \begin{bmatrix} \text{APPL} & \text{blocked} \end{bmatrix} \end{bmatrix} \end{bmatrix} \tag{9}$$

So defined, "eigentlich" does not have an immediate semantic effect but only influences pragmatic interpretation behaviour:

[3] The entire experimental data on "tatsächlich" and modal enrichment and the proper definition of the feature structures will be published somewhere else.

[4] It was nicer if we did not have to rely on the syntactic structure of presumably ψ in order to extract ψ but had an inverse operator presumably^{-1} with presumably^{-1}(presumably ψ) $\equiv \psi$.

$$0[p \rightsquigarrow \neg q][p] \models p \quad (10)$$
$$0[p \rightsquigarrow \neg q][\text{eigentlich } p] \models p \quad (11)$$
$$0[p \rightsquigarrow \neg q][p] \models p \rightsquigarrow \neg q \quad (12)$$
$$0[p \rightsquigarrow \neg q][\text{eigentlich } p] \models p \rightsquigarrow \neg q \quad (13)$$
$$0[p \rightsquigarrow \neg q][p] \models \text{presumably } \neg q \quad (14)$$
$$0[p \rightsquigarrow \neg q][\text{eigentlich } p] \models \text{presumably } \neg q \quad (15)$$
$$0[p \rightsquigarrow \neg q][p] \Rightarrow^{prag} \neg q \quad (16)$$
$$0[p \rightsquigarrow \neg q][\text{eigentlich } p] \not\Rightarrow^{prag} \neg q \quad (17)$$

In example (2-b), B answers that he *eigentlich* has to finish his paper. If "eigentlich" only serves as an MSDC-blocker, then the test subjects could conclude that presumably B will not go out for lunch with A. However, the majority of subjects expected that B presumably *will* go out for lunch with A. How can this be explained? – Like in our old account (Schmitz and Schröder (2004)), the positive expectation is explained as a conversational implicature: B blocks the modal strengthening of the default conclusion that he will presumably not go out for lunch. Thus, he gives only a vague answer to A's question. There must be a reason for blocking the expectation that he will in fact not go out for lunch. The best reason for blocking this expectation is that it is false or at least not certain; it must still be possible that B *will* go out for lunch. Let us assume that B knows whether he will go out for lunch or not: according to his information state, it is possible that he will go only if he will go. Let us alternatively assume that B is not sure whether he will go out for lunch or not: he must have a reason for being unsure, i.e. there must be some competing fact which contradicts the strengthened default conclusion and which is as relevant for B's decision as the fact that he has to finish his paper. The recipient can expect that the competing fact is named in a subsequent sentence. Such a sentence is usually introduced with "aber" (*"but"*) and thereby marked as more relevant for the decision: "Eigentlich muss ich meinen Artikel fertig schreiben, aber ..." *(Eigentlich, I have to finish my paper, but ...)*. The recipient therefore assumes that B presumably will go out for lunch with him.

In the scenario used here, "Eigentlich, I have to finish my paper" entails "Presumably, I will not go out for lunch". The conversational implicature is not generated when B answers with the presumably-sentence instead of the eigentlich-sentence. Why not? – If, on the one hand, a cooperative speaker says that he will presumably not go out for lunch, then, according to his information state, he will presumably not go out for lunch. He cannot have a striking reason *for* going. If, on the other hand, a cooperative speaker says that (eigentlich) he has to finish his paper, then *the recipient* might assume that presumably the speaker will not go out for lunch. It need not be the case that also the speaker makes this assumption; he might still have a good reason for going.

Let me take stock: In order to explain the effect of "eigentlich" observed in the experiments, we need not define "eigentlich" as a default blocker but we can also define it as an MSDC-blocker. This definition has some advantages which will be discussed in the next subsection.[5]

[5] "Eigentlich" can be focused and associated with an operator like "only" (cf. example (i)). How can

4.2 Three advantages of the new account

4.2.1 "Eigentlich ..., und ..."

Let an information state σ be given that entails only two default rules, namely $p \rightsquigarrow \neg q$ and $r \rightsquigarrow q$. If σ is updated with p, then it entails that *presumably* $\neg q$. If σ is updated with r, then it entails that *presumably* q. If σ is updated with (p and r) or (r and q), then no default applies. Per definitionem, the expectations entailed by an information state do not contradict each other; it is not possible that *presumably* $\neg q$ and *presumably* q are both entailed at the same time:

$$0[p \rightsquigarrow \neg q][r \rightsquigarrow q][p \text{ and } r] \not\models \text{presumably } q \tag{18}$$

According to Winter and Rimon (1994), the situation changes when p and r are combined with "but" instead of "and". "But" is asymmetric; an update with (p but r) blocks defaults that otherwise could be drawn from the first conjunct while it licenses defaults that can be drawn from the second conjunct:

$$0[p \rightsquigarrow \neg q][r \rightsquigarrow q][p \text{ but } r] \models \text{presumably } q \tag{19}$$
$$0[p \rightsquigarrow \neg q][r \rightsquigarrow q][r \text{ but } q] \models \text{presumably } \neg q \tag{20}$$

If we follow both Winter and Rimon (1994) and our old account (Schmitz and Schröder (2004)), then sentences of the form "Eigentlich ..., aber (*but*) ..." are redundant: the defaults of the first conjunct are blocked twice, first by "eigentlich" and secondly by "but". The redundancy can be eliminated by deleting "eigentlich" or by replacing "but" with "and":

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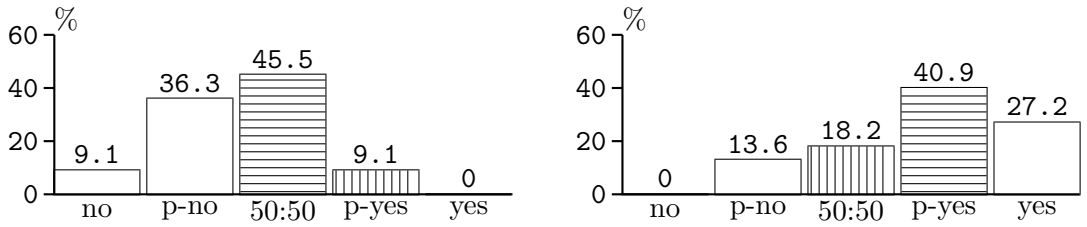
such an association with focus be interpreted when "eigentlich" is semantically empty and only fulfils a pragmatic role (as claimed by the new account)?

(i) Anne muss nur [EIGENTLICH]$_F$ ihren Artikel fertig schreiben.
(Ann has to finish her paper only eigentlich.)

Let us, for the sake of simplicity, assume that "eigentlich" has scope over "Ann has to finish her paper" and "only" has scope over "[eigentlich]$_F$, Ann has to finish her paper". The meaning of example (i) has two components which can be paraphrased as follows: (a) Ann has to finish her paper; modal strengthening of default conclusions that can be drawn from this fact is blocked. (b) No alternative operator of *eigentlich* can be applied to the representation of "Ann has to finish her paper" without making it false. Let one such operator be λP[all default conclusions of P are true]: "all default conclusions of the fact that Ann has to finish her paper are true" is false. The punch line of this explanation is that *eigentlich* can be semantically empty as long as alternatives of *eigentlich* are not. It also provides us with an explanation why example (ii-a) is odd – "eigentlich" can be deleted without changing the meaning – while (ii-b) sounds fine – it is not the case that no alternative operator of *eigentlich* can be applied to the representation of "Ann has to finish her paper" without making it false.

(ii) a. # Anne muss nicht eigentlich ihren Artikel fertig schreiben.
(Ann does not eigentlich have to finish her paper.)
b. Anne muss nicht nur [EIGENTLICH]$_F$ ihren Artikel fertig schreiben.
(Anne does not have to finish er paper only eigentlich.)



(a) Example (9) (b) Example (10)

Figure 3: Experiment: interpretations of examples (9) and (10)

$$(\text{eigentlich } p) \text{ but } r \;\equiv\; p \text{ but } r \;\equiv\; (\text{eigentlich } p) \text{ and } r \tag{21}$$

$$0[p \rightsquigarrow \neg q][r \rightsquigarrow q][\text{eigentlich } p \text{ and } r] \models \text{presumably } q \tag{22}$$

As long Winter's and Rimon's analysis of "but" is accepted, we predict with the old account that the answer of example (9) leads to the positive expectation that Ann will presumably go out for lunch.

(9) Anne, kommst Du mit essen? *(Ann, shall we go out for lunch?)* — Eigentlich muss ich meinen Artikel fertig schreiben, und ich habe großen Hunger. *(Eigentlich, I have to finish my paper and I am really hungry.)*

With the new account, a different prediction is made. "Eigentlich" does not block the contextually relevant default conclusion of the first conjunct. Thus, there are two potential default conclusions that contradict each other: (a) Ann will presumably *not go* out for lunch because she has to finish her paper vs. (b) Ann will presumably *go* out for lunch because she is really hungry. As a result, none of these defaults applies. A recipient should not have any expectation about Ann going out for lunch or not; Ann's answer is therefore uninformative. (This might be the reason why the answer sounds odd.)

$$0[p \rightsquigarrow \neg q][r \rightsquigarrow q][\text{eigentlich } p \text{ and } r] \;\not\models\; \text{presumably } q \tag{23}$$

$$0[p \rightsquigarrow \neg q][r \rightsquigarrow q][\text{eigentlich } p \text{ and } r] \;\not\models\; \text{presumably } \neg q \tag{24}$$

I performed an experiment to evaluate the competing predictions: 22 subjects (all of them native German speakers) were asked to interpret Ann's answer and to name their expectation whether she will go out for lunch or not. The results are depicted in Figure 3(a): only 2 subjects (9.1%) had the expectation predicted by the old account. The relative majority of 10 subjects (45.4%) had no expectation, as was predicted by the new account. In experiments like the ones described here, the test subjects' expectations can be vague. We must take into consideration that there is some variation: although they are undecided, some subjects might choose the more pessimistic option that Ann will presumably not go out for lunch (p-no) or the more optimistic option that Ann will presumably go (p-yes). In view of such variation, the results of the experiment clearly corroborate the prediction of the new account.

4.2.2 " ..., aber eigentlich ..."

(10) Anne, kommst Du mit essen? *(Ann, shall we go out for lunch?)* — Ich muss meinen Artikel fertig schreiben, aber eigentlich habe ich großen Hunger. *(I have to finish my paper, but eigentlich I am really hungry.)*

In example (10), the default conclusion that could be drawn from the first conjunct of Ann's answer is blocked by the use of "but". According to our old account, the default conclusion of the second conjunct is blocked as well, this time by "eigentlich". Therefore, no default applies:

$$0[p \rightsquigarrow \neg q][r \rightsquigarrow q][p \text{ but eigentlich } r] \not\models \text{presumably } q \quad (25)$$

$$0[p \rightsquigarrow \neg q][r \rightsquigarrow q][p \text{ but eigentlich } r] \not\models \text{presumably } \neg q \quad (26)$$

According to the new account, the default conclusion of the first conjunct is blocked by "but". The default conclusion of the second conjunct is not blocked. It can be drawn but it cannot be strengthened:

$$0[p \rightsquigarrow \neg q][r \rightsquigarrow q][p \text{ but eigentlich } r] \models \text{presumably } q \quad (27)$$

$$0[p \rightsquigarrow \neg q][r \rightsquigarrow q][p \text{ but eigentlich } r] \not\Rightarrow^{prag} q \quad (28)$$

The two accounts make different predictions on expectations connected with Ann's answer of example (10). Again, I performed an experiment with 22 subjects – the same subjects as in the previous experiment – in order to test the competing predictions. The results are depicted in Figure 3(b): only 4 subjects (18.2%) had no expectation as predicted by the old account. The relative majority of 9 subjects (40.9%) had the weak positive expectation that Ann will presumably go out for lunch. This was predicted by the new account. If we take variation into consideration, then the results clearly corroborate the prediction of the new account.

4.2.3 Context-dependency

(11) Helmut Eisele ist eigentlich Mathematiker. Er arbeitet als Koch.
(Helmut Eisele is eigentlich a mathematician. He is working as a cook.)

According to Schmitz and Schröder (2004), default blocking is not context-dependent. All default conclusions from the first sentence of example (11) are blocked. This is inadequate, because after interpreting the example one can still conclude that Helmut Eisele presumably has good mathematical knowledge etc. The only default which seems not to apply in the context of this particular example is that Eisele is *working* as a mathematician. (Cf. Weiand (2006).) According to the new account, no default conclusion but only the application of the enrichment operation MSDC is blocked. MSDC is only applied to contextually relevant conclusions. Therefore, the effect of "eigentlich" is correctly described as context-dependent.[6]

[6] The effect of "eigentlich" seems to be connected to the way in which eigentlich-sentences are stressed.

Let me take stock: The old account of Schmitz and Schröder (2004) faces problems regarding the context-dependency of "eigentlich"-sentences and the proper interpretation of "eigentlich ..., und ..."- and "..., aber eigentlich ..."-constructions. These problems are solved by the new account.

4.3 Problem: "eigentlich" as a more general enrichment blocker?

In some cases, the effect of "eigentlich" can be neither explained as a result of default-blocking nor as a result of MSDC-blocking. Consider the following example:

(12) A: Wie spät ist es? *(What time is it?)*
  a. B: Es ist 10 nach 6. Meine Uhr geht übrigens 10 Minuten vor.
  (It's 10 past 6. By the way, my watch is 10 minutes fast.)
  b. B: Tatsächlich ist es 10 nach 6. Meine Uhr ...
  (In fact (tatsächlich), it's 10 past 6. By the way, my watch ...)
  c. B: Eigentlich ist es 10 nach 6. Meine Uhr ...
  (Eigentlich, it's 10 past 6. By the way, my watch ...)

I asked 43 test subjects (only native speakers of German) to interpret the answers (12-a)-(12-c) and to write down what time it is according to the answers. The interpretations of (12-a) and (12-b) confirm the results of the experiments described in section 3: 74.4% of the subjects interpreted the first answer without "tatsächlich" or "eigentlich" non-literally as meaning that is 18:00h. They performed an operation of modal enrichment and understood that it is 10 past 6 *by the speaker's watch*. Contrary, 90.7% of the subjects interpreted the second answer with "tatsächlich" literally as meaning that it is 18:10h. As expected, "tatsächlich" blocks modal enrichment. Also the third answer with "eigentlich" was interpreted literally (by 88.4% of the subjects). It is not clear how this effect can be explained as a result of MSDC-blocking. It seems as if "eigentlich" also blocks other operations of meaning enrichment, e.g. modal enrichment.

We might tentatively claim that "eigentlich" can be used to block different, maybe even all operations of meaning enrichment. This hypothesis is attractive because it provides us with an explanation for the disagreement on the meaning of "eigentlich" (cf. section 1): "eigentlich" can both have a strengthening and a weakening effect. It has a

Does "eigentlich" denote a focus-operator? – Accents can serve several functions, e.g. to make an answer congruent with a preceding question. By accentuation, different context configurations, e.g. different questions under discussion, can be presupposed:

(i) a. Eigentlich muss [ICH]$_F$ meinen Artikel fertig schreiben.
  ((Who has to finish your paper?) Eigentlich, [I]$_F$ have to finish my paper.)
  b. Eigentlich muss ich [MEINEN]$_F$ Artikel fertig schreiben.
  ((Which paper do you have to finish?) Eigentlich, I have to finish [MY]$_F$ paper.)

Due to the different accentuation patterns of the examples (i-a) and (i-b), different questions are presupposed. In answers to these questions, "eigentlich" blocks the strengthening of different default conclusions. What appears to be a focus-effect at first sight can be explained as an epiphenomenon of pragmatically motivated accentuation. We do not have to define "eigentlich" as a focus operator.

strengthening effect when it blocks an operation by which the meaning of an utterance would be weakend; and it has a weakening effect when if blocks an operation by which the meaning of an utterance would be strengthened.

Unfortunately, "eigentlich" does not block all kinds of meaning enrichment, not even all kinds of modal enrichment:

(13) Du hast doch mit Peter gesprochen. Wann kommt er?
(You have talked to Peter. When will he arrive?)
   a. Er kommt um 3 Uhr, er verspätet sich aber wie immer um eine Stunde.
   (He will arrive at 3 o'clock, but as always he will be one hour late.)
   b. Tatsächlich kommt er um 3 Uhr, er verspätet sich aber ..
   (In fact (tatsächlich), he will arrive at 3 o'clock, but as always ...)
   c. Eigentlich kommt er um 3 Uhr, er verspätet sich aber ...
   (Eigentlich, he will arrive at 3 o'clock, but as always...)

An experiment like the one that was performed with example (12) was also performed with example (13) and the same test subjects. I asked the subjects to interpret the answers (13-a)-(13-c) and to write down when Peter will arrive according to the answers. These are the results: More than 2/3 of the subjects (74.4%) interpreted the first answer, without "tatsächlich" or "eigentlich", non-literally. They performed an operation of modal enrichment and understood that *Peter said* that he would arrive at 3 o'clock. Since Peter is always one hour late, the subjects concluded that he will arrive at 4 o'clock. Modal enrichment is blocked by "tatächlich" in the second answer. Accordingly, the majority of subjects (79.1%) interpreted the answer literally and assumed that Peter will arrive at 3 o'clock. Contrary to what we might expect after the experiment with example (12-c), modal enrichment is not blocked but even forced by the use of "eigentlich" in (13-c): 95.3% of the subjects understood that *Peter said* that he will arrive at 3 o'clock and that therefore he will in fact arrive at 4 o'clock. So far, I am not sure how to explain this interpretation.

Let me take stock: Not all effects of "eigentlich" can be easily explained as results of MSDC-blocking. In some cases, "eigentlich" seems to block modal enrichment of sentences. However, contrary to "tatsächlich, "eigentlich" does not always block modal enrichment.

5 Conclusions

We can model "eigentlich" as being used for blocking the modal strengthening of default conclusions. By defining this pragmatic function, we can explain all phenomena that can be explained with the previous account of Schmitz and Schröder (2004). We can also eliminate drawbacks of the previous account. However, there are examples whose explanation is not straightforward. It seems as if the interpretation of "eigentlich" must be extended.

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Keeping Prices Low: an Answer to a Concealed Question *

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Abstract

I propose a novel theory of concealed questions that treats them as ascriptions of *de re*-belief. I adopt Aloni (2000)'s theory of conceptual covers and require that the context supplies a suitable identifier in addition to the one expressed by the argument DP of the concealed question predicate. The theory accounts for the core examples discussed in the literature and makes some interesting new predictions with respect to what DPs are acceptable as concealed questions.

1 Introduction

DPs in argument positions of certain predicates (e.g. object of *know*) can have the same truth-conditional impact as embedded interrogative clauses (cf. Barker, 1968; Heim, 1979). The phenomenon is dubbed **concealed questions** (henceforth, CQs).

(1) a. Cécile knows the capital of Norway.
≈ Cécile knows *what the capital of Norway is.*
b. John knows most of the prices in this supermarket.
≈ For most of the prices in this supermarket John knows *what they are.*

In the following, the DPs in questions will be called **CQ-DPs**, the embedding predicates **CQ-predicates**. *know*$_{CQ}$ differs from the acquaintance reading of *know*: First, acquaintance *know*, but not *know*$_{CQ}$ allow for substitution of co-extensional expressions:

(2) Cécile knows the capital of Norway.
The capital of Norway is the largest town in Norway.
[acquaintance: $\Rightarrow$, CQ: $\not\Rightarrow$] Cécile knows the largest town in Norway.

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(3) John knows a doctor that can treat your illness.
Every doctor that can treat your illness is also a golf instructor.
[acquaintance: ⇒, CQ: ⇏] John knows a golf instructor. Frana (2006)

Moreover, other languages may employ different lexical items for acquaintance and CQ knowledge (e.g. Italian, cf. Frana, 2006):[1]

(4) a. Gianni sa il presidente dell'Italia.
G. knows the president of Italy
'Gianni knows who the president of Italy is.' (only CQ)
b. Gianni conosce il presidente dell'Italia.
G. knows the president of Italy
'G. is (personally) acquainted with the president of Italy.' (no CQ)

The phenomenon raises many questions that have excited greater or lesser interest in previous research: How come a DP gets interpreted like a question? Why are CQs always identity questions? Which predicates embed CQs? Which noun phrases can occur within CQ-DPs? How do particular ambiguities come about (cf. 4.2)?

In answer, I propose an analysis that starts out from the observation that factivity is a crucial ingredient (cf. Frana, 2006). I argue that CQs constitute *de re*-belief reports, and I try to show that Aloni (2000)'s account of *de re*-belief offers a natural solution to the phenomenon under investigation. First, I briefly introduce the existing approaches to CQs. In section three, I discuss a problem with belief attribution that affects all of them and introduce a solution from the literature on *de re*-belief. In section four, I apply it to various subtypes of CQs. After a critical evaluation of the analysis that emerges, I conclude with a few remarks on further research.

2 Three Types of CQ-Theories

Theories of CQs are best grouped together according to what logical type they assign to CQ-predicates, that is, what semantic arguments correspond to the CQ-DP. Currently, the following three apporaches are considered most promising: type *e*-theory, individual concept theory, and propositional theory (cf. Romero, 2006, for detailed comparison).

type *e*-theories assume that $know_{CQ}$ takes two internal arguments, namely an individual u (type e) and a property P (type $P_{\langle s,et\rangle}$). Two variants have been proposed so far, which converge in that the belief subject knows of the individual u picked out by the CQ-DP that u has property P. They differ in where P comes from: Heim (1979) assumes that it is provided by the context, with a strong bias for the property mentioned

[1] Heim (1979) acknowledges the same contrast for German '*kennen* + DP' (only acquaintance) vs. '*wissen* + DP' (only CQ). All speakers I consulted (including myself) agree on *wissen* being limited to CQ readings, but both readings were judged acceptable for *kennen*. The restriction on *kennen* might corresponds to a regional variant.

in the CQ-DP (**pragmatic theory**). In contrast, Frana (2006) assumes that the CQ-DP simultaneously picks out the individual and contributes the property (***de re*-theory**).

individual concept theories (Heim, 1979; Janssen, 1984; Romero, 2005) propose that the CQ-DP denotes an individual concept (that is, a function from indices to individuals, type *se*). E.g., *the capital of Norway* is taken to denote the function that maps each index onto the city that is the capital of Norway at that index.

(5) $$f_{the-capital-of-Norway} := \begin{bmatrix} w_1 & \mapsto & \text{Oslo} \\ w_2 & \mapsto & \text{Paris} \\ w_3 & \mapsto & \text{Vienna} \\ & \dots & \end{bmatrix}$$

a knows x_{se} expresses that the belief subject a knows the correct value of individual concept x_{se} (all indices that constitute doxastic alternatives of the subject agree with the actual world on the value of x). E.g., for Cécile to CQ-know the capital of Norway means that at all worlds that according to her could be the actual one, the capital of Norway is the city that is the capital of Norway in the actual world (Oslo, in our case).

propositional theories of CQs (Nathan, 2006; Romero, 2006, 2007) assume that CQ-DPs quantify over a set of (true) propositions arising as identity predications from the CQ-DP. E.g. *capital of Norway* gives rise to the set $Q = \{u \text{ is capital of Norway} | \ u \in D_e\}$. Depending on the determiner of the CQ-DP, it is expressed that exactly one/at least one/most/every/...element(s) of Q are true at all of the belief subject's doxastic alternatives.

3 A Problem with *de re*-Belief

Apart from Frana (2006), factivity is not treated as essential to the theory of CQs. Moreover, CQs are analyzed in terms of beliefs about individuals simpliciter. The following scenario elucidates that this is highly problematic:

(6) scenario: *John gives you name and address of Dr. Maria Bloom (the individual DMB) who is indeed a doctor who can help you. That same night, John and DMB happen to be at the same party and she is introduced to him as "Mary". They start chatting and, since she is a sparetime semanticist, she entertains him with some classical puzzles of mistaken identity. John is very fascinated and ends up thinking she must be some sort of philosopher (or maybe, philologist?). It does not even occur to him that she might be a doctor.*

Intuitively, both (7-a) and (7-b) can be understood as true in the given scenario:

(7) a. John knows a doctor who can help you.
b. John thinks the person he is currently talking to is not a doctor.

In our scenario, DMB is the individual that verifies (7-a). Yet, DMB is John's interlocutor. Nevertheless, John does not seem entirely unreasonable to us. Hence, John's beliefs cannot be about an individual simpliciter, but have to be about an individual in a particular guise. This problem is not taken into account by the analyses of CQs that have been proposed so far. For (7-a), they derive belief of a singular proposition:[2]

(8) Frana (2006):
$\exists u_e[\text{doctor}(w)(u) \wedge \text{can-help-you}(w)(u) \wedge$
$\forall w' \in Dox_{john}(w)[\text{doctor}(w')(u) \wedge \text{can-help-you}(w')(u)]]$
There is an individual u which is actually a doctor who can help you, and John believes of that individual that he/she is a doctor who can help you.
($\Rightarrow$ John excludes that u is not a doctor)

(9) Nathan (2006):
$\exists p_{st} \exists u_e[p = \lambda w_1.[\text{doctor}(w_1)(u) \wedge \text{can-help-you}(w_1)(u)] \wedge p(w) \wedge$
$\forall w' \in Dox_{john}(w)[p(w')]]$
There is a true proposition that, for some individual u, is of the form "u is a doctor who can help you", and John believes that proposition
($\Rightarrow$ John excludes that u is not a doctor)

The puzzle we have encountered is an instance of Quine (1953)'s **double vision problem**. Similar problems with individual variables arise with cross-identification tasks. Granted that each individual is identical only to him-/herself, (10) would be trivial if *who* were interpreted as running over individuals of type e. Nevertheless, questions of cross-identification can be informative as bringing together e.g. names and persons identifiable by their position in the room.

(10) A: Who is who? - B: The person right next to you is Hans-Christian, the person closest to the window is Monika,. . . .

To solve these issues, it is generally assumed that questioning and belief attribution do not target individuals simpliciter, but only in certain guises. This can be implemented by letting variables range over individual concepts, and we obtain a **contingent identity theory**. Kaplan (1969) points out that we obtain counter-intuitive results if all individual concepts are taken into account.[3] Aloni (2000, 2005) argues that the set of suitable individual concepts depends on the perspective taken on the (relevant) individuals in a particular utterance context.

[2]Romero (2006) only spells out an analysis for an indefinite CQ-DP with *price* as the head noun. *price* is treated as being of type $\langle se, st\rangle$. It is not clear if *doctor* is to be treated likewise. If so, I would expect it to correspond to a set of constant individual concepts. But then, the problem of singular propositions arises again.

[3]The problem has become known as **the shortest spy problem**.

3.1 Conceptual Covers

The perspective taken on the (relevant) individuals in the utterance context corresponds to the concepts the interlocutors would employ to refer to these individuals. Aloni (2000, 2005) models such a perspective as a **conceptual cover**, a set of individual concepts that fulfills two requirements:

(11) Given a set of possible worlds W and a universe of individuals D, a **conceptual cover CC** based on (W, D) is a set of functions $W \rightarrow D$ such that:
$(\forall w \in W)(\forall d \in D)(\exists! c \in CC)[c(w) = d]$

A conceptual cover is therefore a set of individual concepts that meets the requirements of **existence** (at each index, all individuals are picked out), and of **uniqueness** (at each index, each individual is picked out by only one individual concept). What particular conceptual cover is salient determines for example what counts as an appropriate answer to an identity question. Consider *Who is the president of Mali?*:

(12) a. Amadou Toumani Touré. *at a history exam*
b. Him! (pointing at someone) *at a cocktail reception*

According to Groenendijk and Stokhof (1984), a question induces a partition on a set of possible worlds. An answer is relevant if it rules out some or, ideally, all but one of the resulting cells. The difference in relevance of (12-a) vs. (12-b) can be captured, if the partition dependends on what contextual cover is salient. An answer like (12-a) is helpful if the partition is induced with respect to (13), (12-b) is helpful if it is induced with respect to (14).

(13) NC $= \{\lambda w.\iota x[x \text{ is called } a \text{ in } w] \mid a \in K\}$ **naming cover**
partition induced: {*that George W. Bush is the president of Mali, that Amadou Toumani Touré is the president of Mali, that Hilary Clinton is the president of Mali,...*)

(14) RC $= \{\lambda w.d \mid d \in D\}$ **rigid cover**, used in pointing
partition induced: {*that this guy* (pointing at person at the bar) *is the president of Mali*, *that that guy* (pointing at a person close to the entrance) *is the president of Mali,...*}

For a cross-identification question as in (10), two conceptual covers have to be salient.

Moreover, conceptual covers provide the relevant restriction on the guises in which entities can be known *de re*. Following Kaplan, we assume that, e.g., if John believes *de re* of the individual DMB that she is a doctor, there has to be an individual concept x_{se} that (i) picks out DMB in the actual world, and (ii) at each of John's doxastic alternatives picks out an individual that is a doctor, and (iii) not any individual concept would do. Kaplan points out that the third requirement is crucial to avoid things like (15-a) come

out as true *de re*-knowledge, just because Mary is indeed the richest doctor in Germany, and John is reasonable enough to be aware that the richest doctor in Germany is a doctor, while not knowing anything about Mary. Instead of Kaplan's original proposal for (iii), I adopt Aloni (2000)'s theory that suitable individual concepts have to be part of a contextually salient conceptual cover F. The truth conditions for (15-a) can now be rendered as in (15-b).

(15) a. John believes that Mary is a doctor.
b. $\exists^F x[x(w) = \text{DMB} \wedge \forall w' \in Dox_{john}(w)[\text{doctor}(x(w'))]]$

Aloni (2000, 2005) proposes that the principles of Relevance, Informativity, Consistency, and Parsimony (her 'Avoid Accommodation!') jointly govern which conceptual cover is salient in an utterance context. She implements this in bi-directional OT. The first three constraints are inviolable and require respectively that the proposition expressed is relevant to the current task of the conversation, non-trivial and consistent with respect to the current state of information. The violable constraint of Parsimony prohibits to accommodate conceptual covers elements of which are not expressed explicitly. I assume that accommodating a naming cover (NC) is less costly than accommodating any other conceptual cover.

For (15-a), Informativity rules out a value for F that contains "the richest doctor in Germany"; Consistency rules out "the person John has just been introduced to" (we have described the scenario is saying that he does not consider her a doctor). Given that an element of the informal naming cover, "the person called Mary", is used explicitly, the sentence is considered false as a *de re*-report, even if an element from the standard naming cover ("the person called Dr. Maria Bloom") would make it true.

We can now proceed to extend the approach to concealed questions.

4 CQs under Conceptual Covers

4.1 The Basic Idea

For a start, I assume that $know_{CQ}$ takes an individual concept as its internal argument (this will be revised in (28), section 4.3):

(16) $[\![know_{CQ}]\!]^w = \lambda x_{se} \lambda u_e . \exists^F y[y(w) = x(w) \wedge \forall w' \in Dox_u(w)[x(w') = y(w')]]$

According to (16), the subject u *CQ*-knows individual concept x iff

- u has an **identifier** (another individual concept y) for the actual referent of x and
- u knows that x and y pick out the same individual (whichever that is)
- there are pragmatic constraints on what are possible identifiers (y has to come from a conceptual cover F that is contextually salient according to Informativity,

Relevance, Consistency and Parsimony).

For (17-a), I interpret *the capital of Italy* as a definite description of type e and assume that we are allowed to take its intension to avoid a type-mismatch (cf. Lasersohn, 2005).

(17) a. John knows the capital of Italy.
b. $[\![\text{the capital of Italy}]\!]^w$ = Rome
c. $[\![\text{the capital of Italy}]\!] = \lambda w.\iota u_e[\text{capital}(w)(\text{Italy})(u)]$
d. $[\![\text{(17-a)}]\!]^w = 1$ iff $\exists^F x[x(w) = \iota u_e[\text{capital})(w)(\text{Italy})]$
$\wedge\ \forall w' \in Dox_{john}(w)[x(w') = \iota u_e[\text{capital}(w')(\text{Italy})]]$

So, (17-a) is true at the actual world w iff, within the salient conceptual cover, there is an individual concept x which at w picks out the capital of Italy at w and, at all of John's doxastic alternatives also picks out whatever is the capital of Italy there. The information conveyed depends crucially on what conceptual cover F is salient: Because of Informativity, F cannot contain *the capital of Italy*. So, by Parsimony, F is the naming cover, which means that x can only be "the unique object called Rome" ($\lambda w.\iota u[u$ is called "Rome" at $w]$).

In order for other quantifiers to be interpretable, I adopt Nathan (2006)'s type shifts that map relational nouns[4] like *capital* (type $\langle s, \langle e, et\rangle\rangle$) to either sets of individuals (**Shift1**), or sets of individual concepts (**Shift2**).[5]

(18) a. from $\langle s, \langle e, et\rangle\rangle$ to a set of individuals $\langle s, et\rangle$:
$\lambda R_{\langle s,\langle e,et\rangle\rangle}\lambda w\lambda u_e.\exists v_e[R(w)(v)(u)]$ **Shift1**
b. from $\langle s, \langle e, et\rangle\rangle$ to a set of individual concepts $\langle se, e\rangle$:
$\lambda R_{\langle s,\langle e,et\rangle\rangle}\lambda x_{se}.\exists u_e[\forall w[R(w)(u)(x(w))]$ **Shift2**

With cross-categorial entries of quantificational determiners, we obtain quantifiers of type $\langle\langle se, t\rangle, \langle\langle se, t\rangle, t\rangle\rangle$. QR-ing them leaves a trace of type se.[6]

(19) a. John knows most European capitals.
b. [[most European capitals]$_i$ John knows t_i]
c. $[\![\textbf{Shift2}(\text{capitals})]\!]^w = \lambda x_{se}.\exists u_e[\forall w[\text{capital}(w)(u)(x(w))]$
d. Most$(\lambda x_{se}.\text{capital}_{\langle se,t\rangle}(x) \wedge \text{European}(x))$
$(\lambda x_{se}.\exists^F y[y(w) = x(w) \wedge \forall w' \in Dox_{john}(w)[y(w') = x(w')]])$

[4]In the sense of Partee and Borschev (2003), relational nouns are understood as nouns that characterize sets of individuals only with respect to one or more relational arguments, e.g. *capital of x*.

[5]The result of **Shift2** is not world dependent, this avoids Gupta's problem, cf. Dowty et al. (1981); Lasersohn (2005). Floris Roelofsen (p.c.) has pointed out to me that the resulting theory is maybe too restricted. For the moment, I will leave the issue aside.

[6]If *the* shall be treated as a quantifier, too, we need a further type-shift from $\langle s, \langle e, et\rangle\rangle$ to $\langle e, \langle se, t\rangle\rangle$:

(i) $\lambda R\lambda u_e\lambda x_{se}.\forall w[R(w)(u)(x(w))]$ **Shift2b**

Modulo uniqueness presuppositions, the results are the same for relational nouns, but no definite CQ-DPs could be derived from non-relational nouns. Cf. section 5 for discussion.

4.2 Reading A and B

The solution in terms of identifiers depending on contextually salient conceptual covers allows an interesting solution to a puzzling ambiguity observed first in Heim (1979). (20) is ambiguous between reading A (John and Fred have knowledge of the same kind), and reading B (John knows something about Fred's knowledge):

(20) John knows the capital Fred knows.

Reading A For exactly one country u, Fred can tell you what u's capital is, and John can also tell you what u's capital is. (John need not know anything about Fred.)

Reading B For exactly one country u, Fred can tell you what u's capital is, and John can tell you what country u that is. (John knows something about Fred; John need not know what the capital of u is).

A situation that verifies reading B, but not reading A can be described as follows:

(21) *The capital of Italy is Rome.*
Fred knows (≈ believes for good reasons): The capital of Italy is Rome. Fred does not know what any other country's capital is.
John holds possible:
The capital of Italy is Rome and Fred knows: The capital of Italy is Rome.
The capital of Italy is Paris and Fred knows: The capital of Italy is Paris.
The capital of Italy is LA and Fred knows: The capital of Italy is LA.
...

My proposal requires neither cross-cateogrial types of CQ-predicates (cf. Romero, 2006) nor a particular type shift (cf. Nathan, 2006). The ambiguity falls out from what conceptual covers are salient, and, therefore, what identifiers the two belief subjects have for what they are claimed to CQ-know.

(22) a. [John knows [the [[**Shift2**(capital) Fred knows]]]]
b. $[\![$the capital Fred knows$]\!]^w =$
$\iota x_{se}[\text{capital}_{\langle se,t\rangle}(x) \wedge \exists^F y[y(w) = x(w) \wedge \forall w' \in Dox_{fred}(w)[y(w') = x(w')]]$

(23) $[\![$(22-a)$]\!]^w = 1$ iff
$\exists^K z_{se}[z(w) = \iota x_{se}[\text{capital}_{\langle se,t\rangle}(x) \wedge \exists^F y[y(w) = x(w) \wedge$
$\forall w' \in Dox_{fred}(w)[y(w') = x(w')]]](w)$
$\wedge \forall w' \in Dox_{john}(w)[z(w') =$
$\iota x_{se}[\text{capital}_{\langle se,t\rangle}(w)(x) \wedge \exists y[y(w) = x(w) \wedge \forall w' \in Dox_{fred}(w)[y(w') = x(w')]]](w')$

]]

Assume that Fred can identify the capital of Italy as the city called Rome; so, $y =$ "the city called Rome" ($=\lambda w.\iota u_e$.called-Rome$(w)(u)$). This is highly likely because of

INFORMATIVITY and PARSIMONY. Now, either John has the same knowledge (reading A), then $z = y =$ "the city called Rome"; or John knows something about Fred (reading B), namely, that Fred can answer the question what the capital of Italy is (in that case, z is the individual concept that maps every index to the city that at w' is the city-individual u which is the capital of some country v and Fred knows at w' that capital$(w')(v)(u)$).

(24) reading A: $z = y = \lambda w.\iota u[\text{called-Rome}(w)(u)]$
reading B: z is "the capital Fred knows", interpreted as follows:
$z = \lambda w.\iota u[\exists v[\text{capital}(w)(v)(u) \wedge \forall w' \in Dox_{fred}(w)[\text{capital}(w')(v)(u)]]]$
(z = the individual concept that maps every index w' to the city that at w' is the city-individual u which is the capital of some country v and Fred knows at w' that u is the capital of v)

Note that, in our scenario, $\iota x.\text{capital}_{\langle se,t\rangle}(x) \wedge \exists y[y(w) = x(w) \wedge \forall w' \in Dox_{fred}(w)[y(w) = x(w)]$ (the interpretation of the relative clause) is $\lambda w.\iota u_e.\text{capital}(w)(\text{Italy})(u)$. Hence, it is not a possible value for z because it would attribute trivial knowledge to John. The identifier used at the pragmatic level can also be described as "the capital Fred knows". Yet it differs from how the definite description (which is responsible for the identifier to become available!) is interpreted in the course of the semantic computation. This requires closer investigation. As a working hypothesis, I assume that a definite description renders salient as an identifier the intension of its type e-denotation (in the sense of Lasersohn, 2005); - even if the noun is shifted to a set of individual concepts in the course of the semantic computation.

Irene Heim (p.c.) points out a possible problem with disambiguated variants of (20):

(25) a. John knows the same price Fred knows.
b. John knows the price Fred knows, too.

In both cases, only Reading A survives. I think the explanation is that the identifier needed for Reading B (*the price Fred knows*) is no longer expressed overtly (hence, via PARSIMONY), we are stuck with Reading A. [7]

[7] Matters become more complicated though, if presuppositions of additive particles are taken into account. In the following German variant of Heim's examples, as well as its English translation, the ambiguity arises again:

(i) Auch Frank kennt den Preis, den Fred kennt.
also F. knows the price that R. knows
'Frank also knows the price Fred knows.'

In these cases, the identifier is expressed explicitly. Nevertheless, problems arise if the presupposition of further price-knowledge is anchored not to a third belief subject, but to Fred's knowledge as mentioned in the relative clause. I will leave the issue for further research.

4.3 Indefinites

Let us now take a look at indefinites as in (26):

(26) a. John knows a doctor who can help you.
b. John knows a European capital.

In principle, we could treat them as *se*-quantifiers just like *every* and *most*. But it seems highly unintuitive to shift *doctors who can help you* to a set of individual concepts. Intuitively, (26-a) says that John has a means to identify for you a person who (actually and to him) is a doctor who can help you. This is exactly what Frana (2006) aims at.

(27) $\exists^F x[x(w) \in \text{doctor-who-can-help-you}(w) \wedge \forall w' \in Dox_{john}(w)[x(w') \in \text{doctor-who-can-help-you}(w')]$

But this requires a different lexical entry for *know* (type $\langle\langle s,et\rangle,et\rangle$):

(28) $[\![know_{CQ}]\!]^w = \lambda P_{\langle s,et\rangle}\lambda u_e.\exists^F x[x(w) \in P(w) \wedge \forall w' \in Dox_u(w)[x(w') \in P(w')]]$

Assuming that indefinites can be interpreted as properties (cf. Zimmermann, 1993), we immediately obtain (27) for (26-a). If we allow for a typeshift from *se* to $\langle s,et\rangle$ (**Shift 3**), we can give up the original entry for $know_{CQ}$, (16), and use (28) for definite descriptions and quantifiers as well. The result for the simple definite description is given in (30). For any u_e, x_{se}, w_s: $[u \in (\lambda v.v = x(w))]$ is equivalent to $[u = x(w)]$, so it is equivalent to the original (17-d).

(29) $\lambda x_{se}\lambda w\lambda u_e.u = x(w)$ **Shift 3**

(30) $[\![\text{John knows the capital of Italy.}]\!]^w = 1$ iff $\exists^F x[x(w) \in (\lambda u_e.u = \iota v[\text{capital}(w)(\text{Italy})(v)]) \wedge \forall w' \in Dox_{john}(w)[x(w') \in (\lambda u_e.u = \iota v[\text{capital}(w')(\text{Italy})(v)])]]$

If indefinites can be both quantifiers and properties, the framework offers two possibilities of dealing with indefinite CQs: *doctor (who can help you)* does not normally shift to a set of individual concepts, hence, (26-a) is interpreted with the indefinite in situ denoting a property (cf. (27)). But *capital* can undergo both **Shift1** (to a set of cities that are capital of some country or other) and **Shift2** (to a set of individual concepts recording some country's capital each); thus, we predict the following two construals for (26-b):

(31) [John knows [a Euorpean **Shift1**(capital)]]
$\exists^F x[x(w) \in \text{European-capital}_{\langle s,et\rangle}(w) \wedge \forall w' \in Dox_{john}(w)[x(w') \in \text{European-capital}_{\langle s,et\rangle}(w')]$

(32) [[a European-**Shift2**(capital)]$_i$ John knows t_i]
$\textsc{a}(\lambda x_{se}.\text{European-capital}_{\langle se,t\rangle}(x))$

$$(\lambda x_{se}.\exists^F y[y(w) = x(w) \wedge \forall w' \in Dox_{john}(w)[y(w') = x(w')]])$$

Let us first see what these construals correspond to. (26-b) can be interpreted as saying e.g. that John can name one city of which he knows that this is a Euorpean capital (without knowing which country's capital that is) (then (31) is true, but (32) is false). But (26-b) can also be understood as saying that John could answer only one question out of "What is the capital of the European country x?" (with x ranging over a contextually relevant set of European countries). Indeed this has been suggested as the only kind of reading available for (at least, abstract) relational nouns (cf. Frana, 2006).[8]

(33) John knows a price (in this supermarket).
e.g.: *John knows that the butter costs 1.30.*
and not: *John knows that 1.30 is a price (of some object or other).*

But is this an independent reading which corresponds to (32), or is it just a stronger interpretation of (31)? The following scenario indicates that (32) constitutes an independent reading:

(34) *Peter takes part in a quiz and has to answer questions i-iv about American capitals and v-viii about European capitals:*
(i) *What is the capital of Massachusetts?*
(ii) *What is the capital of Vermont?*
(iii) *What is the capital of Texas?*
(iv) *What is the capital of California?*
(v) *What is the capital of Norway?*
(vi) *What is the capital of Italy?*
(vii) *What is the capital of Austria?*
(viii) *What is the capital of Germany?*

Peter answers most of the questions correctly. After the quiz, John (the quizmaster), has to report which questions each candidate could answer. John himself has no clue what the correct answers are, and he isn't even very good at remem-

[8] Heim (1979) (p.60) describes a scenario in which a noun *phone number*, usually also associated with the stronger knowledge "knowing a phone number as someone's phone number", is just known to fall under the existentially closed predicate **Shift1**(phone number). She considers (i) in the scenario described below.

(i) John knows every phone number.

Suppose, John's task is to assign to a new phone a number which is not yet taken by any other phone. Then he needs to "know every phone number", not in the sense of knowing which number is whose, however, but merely in the sense of knowing which numbers are somebody's at all. This reading seems to involve quantification over phone numbers as individuals and should come out roughly as in (ii).

(ii) $\textsc{Every}(\lambda u.\text{phone-number}_{\langle s,et\rangle}(w)(u))$
$(\lambda u.\exists^F x[x(w) = u \wedge \forall w' \in Dox_j(w)[x(w') \in \text{phone-number}_{\langle s,et\rangle}(w')]])$

It remains to be worked out how this reading can be generated in a systematic way.

bering which questions the candidates could answer. Eventualy, John remembers that Peter got the capital of Austria right. So, John knows a European capital.

I think that scenario makes (26-b) true on a non-trivial reading, that is not captured by (31). The construal in (31) would hold true in the scenario, if we interpreted (26-b) as saying that (without thinking of Peter), John managed to remember that Austria was a European country (hence, "the capital of Austria" (whatever it is), would be some European capital). But in the given scenario, this is not the reading we are after: we report John as knowing something about Peter's performance, namely, which European capital-question he could answer. This is obtained from (26-b) if y is "the capital Peter identified correctly" (John himself neither has to know that this is Vienna nor that Austria is a European country). In the given context, (26-b) amounts to:

(35) there is an x_{se} which describes the capital of some European country (namely, $\lambda w.\iota u_e[\text{capital}(w)(\text{Austria})(u)]$), such that John can identify it (by y = "the capital Peter identified correctly")

5 Evaluating the analysis

My proposal combines insights of type e-theories and individual concept theories. Type theoretically, it constitutes a new type of analysis: $know_{CQ}$ combines with a property P (type $\langle s, et\rangle$). Definite, indefinite and quantificational CQ-DPs are captured correctly, including ambiguities as arising from relative clause modification (readings A/B) as well as lesser investigated phenomena arising with indefinite CQ-DPs. A full-fledged theory of *de re*-belief is incorporated, which avoids incorrect belief ascriptions of knowledge about naked individuals (singular propositions). My analysis offers no new insights w.r.t. what are possible CQ-predicates. Despite Nathan (2006)'s careful study in favor of propositional embedding predicates, the class remains somewhat mysterious and seems to be influenced by purely lexical factors, especially when investigated cross-linguistically. For the moment, I follow Frana (2006) in rendering essential the one property common to all CQ-predicates, namely factivity.

Both type e-theories and individual concept theories have been criticized for their incorrect predictions with respect to **coordination**. Neither argument positions with type e nor with *se* can be coordinated with concealed questions:

(36) a. #John told me, and Mary visited, the capital of Norway. *e*-failure
b. #The price of milk fell last week and is known to John. *se*-failure

In contrast, the predictions of the property analysis are quite favorable. If Zimmermann (1993) is correct, opaque verbs like *suchen/look for* take property type arguments. German (37) and its English translation may not be perfect, but they are judged considerably better than coordinations involving e and *se* positions. (Note that *weiss*+DP can only have a CQ-reading, cf. footnote 1.)

(37) ?Hans sucht und Maria weiss einen Arzt, der Krebs heilen kann.
H. looks.for and Mary knows a doctor who cancer cure can
'?Hans is looking for, and Mary knows a doctor who can cure cancer.'

So far, only Nathan (2006) tries to answer the question of what are possible **head-nouns of CQ-DPs**. He presents a strictly type-logical analysis that constrains simple CQs to relational nouns. Only relational nouns can be shifted to a set of propositions as required for his CQ-analysis. Nathan (2006) observes that certain modifiers, in particular postnominal adjective and restrictive relative clauses can help to achieve acceptable CQs. He relates this to their inherent clausal make-up and devises special type shifters. Romero (2006) discusses some compositionality problems that arise if CQs are made to depend on the internal make up of the CQ-DP. But apart from that, Nathan (2006)'s notion of relationality is ad hoc (cf. his footnote 3, p.87). E.g., *picture* is claimed to be non-relational. As acknowledged by Nathan himself, this does not conform to any independent test of relationality (cf. Barker, 1995; Partee and Borschev, 2003). E.g., in English, only relational nouns allow for postnominal genitives (*of Peter*, cf. (38-a) vs. (38-c)). Contextually given relations holding with respect to non-relational nouns or non-inherent readings for relational nouns are expressed by 'double genitives' (e.g. *of Peter's*).

(38) a. the picture of Peter
b. the picture of Peter's
c. the horse of Peter/*Peter's

The type-logical restriction does not offer any explanation why in the absence of independent semantic reflexes, non-relational nouns can be understood as relational in certain contexts, suddenly allowing for the formation of CQs. In particular, no account is offered why just about any head noun can occur as an acceptable CQ-DP when reporting someone's performance on a quiz show (cf. Frana, 2006).

For these reasons, I consider a genuinely pragmatic solution to the restrictions more promising. The analysis I have proposed here, solely in virtue of relying on conceptual covers, predicts at least some of the restrictions observed on CQ-DPs. According to my theory, *CQ*-knowledge requires that there be a salient conceptual cover (of some set of relevant individuals) that does not contain the interpretation of the CQ-DP: the identifier crucial for CQ-knowledge cannot correspond to the interpretation of the CQ-DP because this would attribute trivial knowledge and would thus violate INFORMATIVITY. This immediately explains the contrast between (39-a) and (39-b), recognized as problematic for her pragmatic proposal in Heim (1979). Given that the naming cover is available for free (cf. PARSIMONY), for (39-a), it is easy to come up with a conceptual cover that does not contain the interpretation of *the capital of Italy*. For (39-b), of course C = $\{\lambda w.\iota u[u$ is the capital of $x \mid x$ is a country$\}$ would be an appropriate conceptual cover. Nevertheless, it is not rendered salient explicitly and thus violates PARSIMONY.[9]

[9]Spelling out in more detail Aloni (2000)'s bi-directional account, (39-b) should simply be blocked by (39-a).

(39) a. I know the capital of Italy.
b. #I know Rome.

It is also predicted that objects without proper names do not make for good concealed questions. While *carburetor (of the engine)* is clearly relational, (40) is reportedly infelicitous (cf. Nathan, 2006).

(40) #I know the carburetor.

Normally, carburetors do not have names; hence, we lack a conceptual cover that would contain an alternative identifier for the carburetor of my car.[10] Note, that quite in general, pointing (hence, the rigid cover), does not seem to be a valid method of identification for CQs. Excluding the rigid cover (maybe because of interference with acquaintance knowledge), we can also explain why CQs cannot be understood as *which*-questions (Nathan, 2006). E.g. in reply to *Three of these four puppies are male*:

(41) Tell me *which one the female is./#the female.*

Frana (2006) observes that, when reporting the outcome of a quiz where people have to recognize pictures, even CQs like (40) become acceptable. I think the theory in terms of conceptual covers offers a nice explanation for this fact: a quiz of that type immediately renders acceptable a conceptual cover like PictureC = {the object presented on picture one, the object presented on picture two,...}; analogously for other quiz forms.[11]

6 Conclusion

I have outlined a novel analysis of CQs that relies on a property type for the CQ-DP (or its trace). CQs are treated as ascriptions of *de re*-belief, analyzed along the lines of Aloni (2000, 2005). CQs thus depend on the perspective taken on the relevant individuals in the context of the conversation (conceptual covers). This accounts for standard examples with all type of CQ-DPs as well as various types of ambiguities, and it makes interesting predictions with respect to what are possible CQ-DPs. Further study is required w.r.t. the implications of the property type, and in particular the pragmatic factors involved in what constitute salient conceptual covers.

[10] For German, Hans-Christian Schmitz (p.c.) reports that the translation of (40) becomes grammatical when wondering about the particular type of carburetor - which, again, has a standard name.

[11] Past tense tends to refer to events of identification and can thus help to establish particular conceptual covers. This pertains also to an example Nathan (2006) (p.55) attributes to Kai von Fintel (p.c.) and qualifies as marginally possible:

(i) (I asked John the capital of Italy, and Peter the capital of Germany.)
John knew Rome but Peter didn't know Berlin.

Here, informative identifiers could be 'the capital I asked John/Peter', avoiding competition with the unmarked *John knew the capital of Italy, but Peter didn't know the capital of Germany.*

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Many and Diverse Cases: Q-adjectives and Conjunction*

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Abstract

This paper analyzes the conjunction of the 'adjectives of quantity' *many* and *few* with ordinary gradable adjectives. It is shown that the facts surrounding this construction support an analysis of adjectives of quantity as 'degree predicates': predicates of intervals on the scale of cardinality. It is further shown that gradable adjectives also have a secondary interpretation as degree predicates.

1 Introduction

The subject of this paper is the construction exemplified in (1), in which an ordinary gradable adjective is conjoined with *many* or *few*, words that I will refer to as adjectives of quantity (Q-adjectives for short).

(1) a. Professor Jones' **many and important** contributions to the field…
b. The flaws in the proposal were **many and serious**
c. The stains on the shirt were **few and small**
d. The ingredients are **simple and few**

Examples such as these are not entirely colloquial, ranging in register from the slightly formal to the poetic; but they are nonetheless quite common, and as such require some sort of account.

My goal at the simplest level is to provide a semantic analysis of this construction. While this is perhaps a small question, I believe it is nonetheless interesting, for two reasons: first, because cases such as (1) have not, to my knowledge, been the subject of any serious semantic investigation; second, and more importantly, because the

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availability of conjunctions of this form yields insights into the semantics of Q-adjectives, and of gradable adjectives more generally. I will show that the facts surrounding this construction support an analysis of Q-adjectives as 'degree predicates' – predicates of intervals on the scale of cardinality – and furthermore point to the existence of a secondary interpretation of this type for ordinary gradable adjectives.

The organization of the paper is the following. In Section 2, I outline the broader question that these data are relevant to. In Section 3, I present the crucial data on the availability of conjunctions of the sort in (1). Section 4 develops an analysis of these facts, and Section 5 discusses some implications of this analysis. Section 6 summarizes with conclusions and remaining questions.

2 The Broader Question

What makes the data in (1) interesting is that they yield insight into the correct semantic analysis of Q-adjectives. As has been observed repeatedly in the literature (e.g. Hoeksema 1983; Partee 1989; Kayne 2005), *many* and *few* are notable in that their behaviour straddles that of quantifiers and adjectives. They may occur in the same syntactic positions (in a pretheoretic sense) as quantifiers such as *most* (2):

(2) a. Many/few lawyers are greedy
b. All/most/some/no lawyers are greedy

But they inflect like gradable adjectives, having comparative and superlative forms (3); and like 'ordinary' adjectives they may occur as (apparent) attributive modifiers and sentential predicates (4):

(3) more, most; fewer, fewest

(4) a. His many/few good qualities….
b. His good qualities are many/few

One approach to these facts holds that Q-adjectives in fact have the semantic type of adjectives, perhaps in addition to a quantificational type (Milsark 1977; Hoeksema 1983; Partee 1989). That is, they denote cardinality predicates – predicates of groups or plural individuals that hold true if the group is large (for *many*) or small (for *few*), as shown in the entries in (5a), or the more explicitly gradable entries in (5b):

(5) a. $[\![\text{many}]\!] = \lambda X.\,|X| \text{ is large}$ $[\![\text{few}]\!] = \lambda X.\,|X| \text{ is small}$
b. $[\![\text{many}]\!] = \lambda d \lambda X.\,|X| \geq d$ $[\![\text{few}]\!] = \lambda d \lambda X.\,|X| \leq d$

On this view (particularly with the representations in (5b)), the semantics of Q-adjectives are directly parallel to what is commonly assumed for gradable adjectives:

(6) $[\![\text{expensive}]\!] = \lambda d\lambda x.\text{COST}(x) \geq d$

This analysis also aligns to a broader tradition in which cardinal numbers are analyzed as predicates or modifiers (Krifka 1999; Landman 2004; Ionin & Matushansky 2006).

On another (less established) view, Q-adjectives are analyzed as predicates, but not predicates of groups or individuals themselves. Rather, they are predicated of something in the domain of degrees – a degree or set of degrees associated with a group of individuals or situation (Schwarzschild 2006; Rett 2006; Heim 2006 on *little*; see also Kayne 2005 for a parallel syntactic analysis). This approach could be captured with the preliminary entries in (7), where *I* is a set of degrees (a scalar interval):

(7) $[\![\text{many}]\!] = \lambda I_{<dt,t>}.\text{I is large}$ $[\![\text{few}]\!] = \lambda I_{<dt,t>}.\text{I is small}$

In other work (Solt 2007a, 2007b), I have argued that the predicate-of-degrees account represented in (7) overcomes several shortcomings of the predicate-of-individuals account in (5). One case involves the differential uses of Q-adjectives, as in (8); crucially, *many* in (8) cannot be analyzed as predicated of a group or plurality (there is no plurality that has the property of 'many-ness'), but can readily be analyzed as predicated of the gap or interval between the number of students who attended and 100.

(8) Many fewer than 100 students attended the lecture

Additionally, *many* and *few* as defined in (7) are degree operators, scope-taking elements that we would expect to interact scopally with other operators (cf. Heim 2006). This provides an approach to analyzing so-called split scope readings (as in (9a), whose preferred interpretation is that paraphrased in (9b)):

(9) a. They need few reasons to fire you
b. 'it is <u>not</u> the case that they <u>need</u> a <u>large #</u> of reasons…'

The same mechanism also allows for the derivation of a quantificational interpretation for *few* via simple existential closure, without giving rise to what has come to be known as 'van Benthem's problem' (van Benthem 1986), where application of existential closure to a monotone decreasing predicate incorrectly produces an 'at least' reading. The solution offered by the predicate-of-degrees (i.e., degree-operator) analysis in (7) is that for type-driven reasons, *few* necessarily takes scope over the existential quantifier, such that (10a) receives the correct representation in (10b), not the incorrect representation in (10c):

(10) a. Few trees died
b. $\text{few}(\{d: \exists X[\text{tree}(X) \wedge \text{died}(X) \wedge |X| \geq d]\})$ ✓
c. $\exists X[\text{tree}(X) \wedge \text{died}(X) \wedge \text{few}(X)]$ ✖

The broader question that I address in this paper is which of these two accounts is the correct one. The relevance of the construction exemplified in (1) is that it provides evidence towards answering this question, in that the two theories discussed above seemingly make different predictions in this area. Specifically, under the predicate-of-individuals account, we would predict that conjunctions of ordinary adjectives and Q-adjectives would be possible, in that they would reflect the simple intersection of two properties:

(11) $[\![\text{many and important}]\!] = [\![\text{many}]\!] \cap [\![\text{important}]\!]$
$= \lambda X.\text{many}(X) \wedge \text{important}(X)$

Conversely, under the predicate-of-degrees account, we would predict that this sort of conjunction would be disallowed, given the typical restriction of conjunction to elements of the same semantic type.

On the surface, then, the existence of examples such as (1) would appear to support the first of these possible theories (predicate-of-individuals), and to offer strong evidence against the second (predicate-of-degrees).

In what follows, however, I will argue that the situation is not as simple as this. An examination of the constraints on the conjunction of Q-adjectives with ordinary adjectives in fact supports the predicate-of-degrees account, and is incompatible with the predicate-of-individuals account. A corollary of the analysis will be the finding that gradable adjectives have a secondary interpretation of predicates of degrees.

3 The Data: Constraints on Conjunction

To start, a broad range of adjective types may be conjoined with Q-adjectives, including adjectives of size (12a), other physical characteristics (12b,c), age (12d), and cost or value (12e), as well as evaluative adjectives (12f,g):

(12) a. The holes in the sail were **many and large**
b. The fans were **many and loud**
c. The lights in the room were **few and dim**
d. The documents in the archive were **many and old**
e. Air links to Europe and Asia are **few and expensive**
f. The waiters were **few and surly**
g. His **many and beautiful** possessions…
h. The opportunities available to our students are **many and diverse**

Both collective and distributive interpretations are possible for the conjoined adjective. For example, *large* in (12a) distributes over the holes (they must be large individually, not just in aggregate), whereas in (12h) *diverse* true of the opportunities as a whole.

As seen above, the Q-adjective is typically the first conjunct, though the reverse is possible (as in (1d)). Finally, conjunctions of this sort may occur in predicative (13a) and attributive (13b) positions, though are less felicitous when *many* or *few* has a quantificational use (13c):

(13) a. The problems were **many and serious**
b. The **many and serious** problems…
c. ?? We discovered **many and serious** problems

But despite the broad availability of Q-adjective/adjective conjunctions, there are two crucial semantic constraints on this construction. First, only gradable adjectives can be conjoined with Q-adjectives, as illustrated by the contrasts in (14)-(16):

(14) a. The fans were **many and loud**
b. ??The fans were **many and American**

(15) a. The tables in the hall were **many and large**
b. ??The tables in the hall were **many and octagonal**
c. ??The tables in the hall were **many and wooden**

(16) a. The stains on the shirt were **few and small**
b. ??The stains on the shirt were **few and green**

Already we see the behavior of Q-adjectives diverging from that of ordinary gradable adjectives: While there are some constraints on how adjectives may be conjoined, there is no general prohibition against the conjunction of the gradable adjectives with their non-gradable counterparts, as seen below:

(17) a. The tables in the hall were **large and octagonal**
b. The stains on the shirt were **small and green**
c. The floor was **wooden and smooth**
d. I got the shoes because they were **red and cheap**
e. We had heard that most of the guests were **American and rude**

The gradability restriction can be overridden if a non-gradable adjective is coerced into a gradable interpretation, or interpreted as a point on a scale Thus (18a) is fine on the interpretation of *black* as serious (cf. *his sins are blacker than mine*), while (18b) is acceptable with *mostly American* describing the proportion of Americans in the crowd. Even the initially bizarre (18c) is perfectly acceptable if we imagine ourselves in the world of Flatland (Abbott 1884), where everyone and everything is two-dimensional, and the more angles one has, the higher his or her social status.

(18) a. His sins were **many and black**
b. The attendees were **few and mostly American**

c. Her friends were **many and octagonal**

The second constraint has to do with the interpretation that Q-adjective/adjective conjunctions may receive. In each of the examples introduced above, the conjoined Q-adjective and adjective are in a sense interpreted jointly. Specifically, the adjective is interpreted as in some way amplifying the cardinality established by the Q-adjective (or vice versa). In (12a) the holes were not only numerous, but large as well; in (12c), the lights were not only few in number, but dim as well; in (12e), not only are there few air connections to Europe, but those that exist are expensive; and so forth.

To put this another way, in each case the Q-adjective/adjective conjunction can be interpreted as positioning the subject relative to some compound dimension formed on the basis of cardinality and a dimension consistent with the gradable adjective: in (12a) the total area of the holes (a function of their number and the size of each); in (12c) the total intensity of the lights (a function of their number and their individual intensity), in (12e) perhaps the availability of good air links to Europe and Asia (a function of their number and cost). Appropriate compound dimensions can likewise be found in the other examples introduced above.

In the cases discussed up to this point, the relationship between the dimensions could be termed multiplicative. A different sort of relationship, which might be termed causal, is exemplified below. (19a) implies that the clothes you pack need to be versatile because they must be few. Similarly, in (19b), a line from a once-popular song, we likewise get the impression that the moments we can share are precious precisely because they are few; if they were fewer still they would be even more precious. Here too it seems that we have a single compound dimension, in that the two components vary together, not independently.

(19) a. The clothes you pack should be **few and versatile**
b. **Precious and few** are the moments we two can share

As evidence that some relationship between dimensions is actually required for the interpretation of Q-adjective/adjective conjunctions, consider the following example:

(20) ?The senators supporting the proposal were **many and tall**

On first reading (20) is quite odd, there being no obvious way that the senators' height amplifies their 'many-ness' (or is correlated with it). But it improves considerably when we imagine a scenario in which the number of votes a senator has is proportional to his or her height, such that a group of senators who are many and tall has greater voting power than a group who are many but average height or short. In other words, (20) is rescued by inferring some complex dimension on which the subject can be measured.

Turning again to a comparison with ordinary gradable adjectives, we see a different pattern: While there may sometimes be a similar sort of relationship between the dimensions referenced by two conjoined adjectives, it is relatively easy to find or construct examples in which this is not the case, as in the examples below (this is also particularly true of the examples in (17)):

(21) a. The villages in the surrounding area are small and beautiful
b. Our conversations were short and friendly

Thus the behaviour of Q-adjective/adjective conjunctions differs from that of conjunctions of ordinary adjectives in two significant respects. This is unexpected under the predicate-of-individuals analysis, in which Q-adjectives are taken to have the same semantic type as gradable adjectives such as *expensive*. Below, I will argue that these facts receive a neat account under the predicate-of-degrees analysis.

4 The Analysis

The basic idea behind the analysis is the following: Q-adjective/adjective conjunctions are predicates of **degrees on the scale of a compound dimension** formed on the basis of **number** and a dimension associated with the gradable adjective.

I begin with some formal preliminaries. I assume an ontology that includes degrees as a primitive type (type *d*). A scale *S* consists of a set of degrees *D* ordered by some ordering relationship > relative to some dimension *DIM*. Dimensions include amount dimensions (the monotonic dimensions of Schwarzschild 2006), such as volume and weight, and non-amount dimensions such as height, area, cost, etc. A special case of an amount dimension is cardinality (number), whose associated scale is the set of natural numbers (or perhaps the rational or real numbers; cf. Fox & Hackl 2006).

Here, I take degrees to be points, contra recent interval-based accounts such as that of Kennedy (2001). But as suggested above, the notion of an interval is a crucial one. I therefore define an interval as an uninterupted set of degrees, expressed formally as:

(22) A set of degrees $I \subset D$ is an **interval** iff
$\forall d, d', d'' \in D$ such that $d > d'' > d'$, $(d \in I \wedge d' \in I) \rightarrow d'' \in I$

Let us then take (23) as the lexical entries for the Q-adjectives *many* and *few*[1]:

[1]To be precise, the entries in (23) should be viewed as the result of the composition of more basic gradable entries for *many/few* with a null positive morpheme POS (von Stechow 2006; Heim 2006). For simplicity of representation, I do not show this step.

(23) a. $[\![\text{many}]\!] = \lambda I_{\#}.I \text{ is 'large'} = \lambda I_{\#}.N_{\#} \subset I$ b. $[\![\text{few}]\!] = \lambda I_{\#}.\ I \text{ is 'small'} = \lambda I_{\#}.N_{\#} \subset \text{INV}(I)$

Here, the subscript # indicates that the interval in question lies on the scale of cardinality. $N_{\#}$ is the 'neutral range' on that scale, the range of values that would be considered neither large nor small with respect to the context (von Stechow 2006; Heim 2006). Finally, *INV* is a function that maps an interval to the join complementary interval. On this view, *many* is true of an interval if it is 'large', defined as fully containing the neutral range; *few* is true of an interval it is 'small', defined as fully excluding that same neutral range.

Turning now to how Q-adjectives (predicates of scalar intervals) may combine with nominal expressions (predicates of individuals), I follow Schwarzschild (2006) in taking the linking function to be played by a phonologically null functional head Meas, whose semantic content is the measure function in (24):

(24) $[\![\text{Meas}]\!] = \lambda X \lambda d.\text{Meas}_{\text{DIM}}(X) \geq d$

Meas associates a (possibly plural) individual *X* with a set of degrees on the scale associated with some dimension *DIM*. As will become clear below, Meas does not encode a specific dimension; the specific dimension must be 'filled in' on interpretation.

To see how these pieces come together, consider a simple case of predicative *many*:

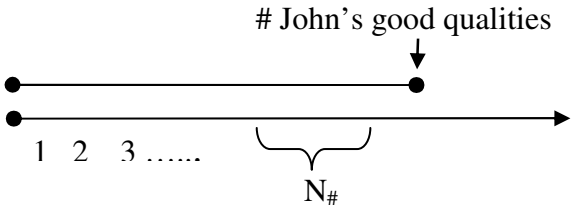
(25) John's good qualities are many

I propose that here, the subject is a MeasP, such that the logical form is that in (26a). The semantic interpretation is then that in (26b), which corresponds to the situation depicted visually in (26c):

(26) a. $[[_{\text{MeasP}}\ \text{Meas}\ [_{\text{DP}}\ \text{John's good qualities}]]\ \text{are many}]$

b. $[\![\text{many}]\!]\ (\ [\![[_{\text{MeasP}}\ \text{Meas}\ [_{\text{DP}}\ \text{John's good qualities}]]]\!]\ )$
$= \exists \text{DIM}\ [(\lambda I_{\#}.N_{\#} \subset I)(\lambda d.\text{Meas}_{\text{DIM}}(\text{John's good qualities}) \geq d))]$
$= \exists \text{DIM}\ [N_{\#} \subset \{d: \text{Meas}_{\text{DIM}}(\text{John's good qualities}) \geq d\}]$
$= N_{\#} \subset \{d: \text{Meas}_{\#}(\text{John's good qualities}) \geq d\}$

c.



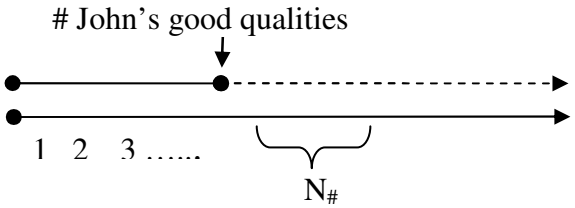
Here, the formal representation can be taken to involve existential quantification over the dimension introduced by Meas (as in the second line of (26b)); but since *many* itself is restricted to operating on intervals of cardinality, this can be translated to a simpler cardinality-based representation can be given (as in the fourth line of (26b)).

The derivation is identical in the case of *few*, with the exception that the *INV* function maps the original interval to the join complementary interval, as in (27b) and the diagram in (27c):

(27) a. $[[_{MeasP}$ Meas $[_{DP}$ John's good qualities]] are few]

b. $\llbracket$few$\rrbracket$ ($\llbracket[_{MeasP}$ Meas $[_{DP}$ John's good qualities]]$\rrbracket$)
$= \exists DIM\ [(\lambda I_{\#}.N_{\#} \subset INV(I))(\lambda d.Meas_{DIM}(\text{John's good qualities}) \geq d))]$
$= \exists DIM\ [N_{\#} \subset INV(\{d: Meas_{DIM}(\text{John's good qualities}) \geq d\})]$
$= \exists DIM\ [N_{\#} \subset (\{d: Meas_{DIM}(\text{John's good qualities}) \leq d\})]$
$= N_{\#} \subset \{d: Meas_{\#}(\text{John's good qualities}) \leq d\}$

c.



Importantly, in (26) and (27) it is the presence of the Q-adjective *many* or *few* that allows us to infer that the dimension in question is cardinality. In the presence of a different expression of quantity, such as a measure phrase, a different dimension will be inferred. For example, in (28a) we assume a dimension on which wine can be measured, and whose measure can be two gallons; that dimension is of course volume:

(28) a We drank two gallons of wine

b. $\exists DIM\ [\text{2-gallons} \subset \{d: \exists X[wine(X) \ \&\ drank(we,X) \ \&\ Meas_{DIM}(X) \geq d]\}]$
$= \text{2-gallons} \subset \{d: \exists X[wine(X) \ \&\ drank(we,X) \ \&\ Meas_{VOLUME}(X) \geq d]\}$

To apply this approach to the Q-adjective/adjective conjunctions that are the subject of this paper, we need only to introduce one further extension: the dimension introduced by Meas may be a complex dimension formed on the basis of two component dimensions. Thus in the 'multiplicative' cases exemplified in (12), we may view the measure function Meas as asociating an individual with a set of degrees each of which is analyzable as the product of two component degrees. Equivalently, Meas itself may be viewed decomposable into two component measure functions:

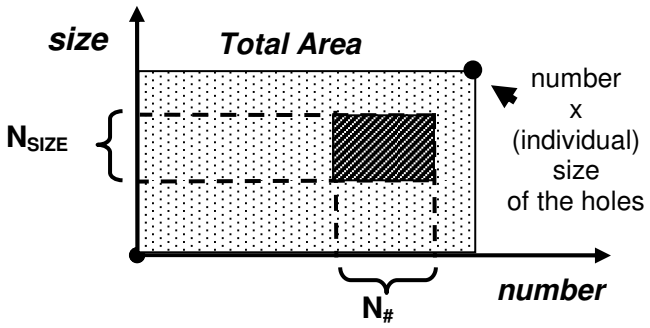
(29) $\llbracket$Meas$\rrbracket$ (X) $= \lambda d.Meas_{DIM}(X) \geq d$, where $d = d_1 \times d_2$
$= < \lambda d_1.Meas_{DIM1}(X) \geq d_1, \lambda d_2.Meas_{DIM2}(X) \geq d_2 >$

With this in place, we are now ready to provide a formal analysis of Q-adjective/ adjective conjunctions. Consider again an example such as (12a), repeated below, which as discussed earlier can be interpreted as asserting that the total area of the holes (a function of their number and their individual size) was large.

(30) The holes in the sail were many and large

In the interval-based approach developed here, we can in turn interpret this as stating that on the scale associated with the compound dimension total area (a product of number and individual size), the two-dimensional 'interval' corresponding to the number and size of the holes was large. Large, again, can be formalized as fully containing the relevant neutral range (here, a two-dimensional one). Visually:

(31)



Formally, the semantic derivation proceeds as follows:

(32) $[\![\text{many and large}]\!]\ (\ [\![[_{\text{MeasP}}\ \text{Meas}\ [\text{the holes}]]]\!]\ )$

$= \exists \text{DIM}\ [\ [\![\text{many and large}]\!]\ (\lambda d = d_1 \times d_2.\ \text{MEAS}_{\text{DIM}}(\text{the holes}) \geq d)]$

$= \exists \text{DIM} = \text{DIM}_1 \times \text{DIM}_2\ [\ [\![\text{many}]\!]\ (\lambda d_1.\ \text{MEAS}_{\text{DIM1}}(\text{the holes}) \geq d_1)$
$\wedge\ [\![\text{large}]\!]\ (\lambda d_2.\forall x \in \text{the holes}[\text{MEAS}_{\text{DIM2}}(x) \geq d_2])\ ]$

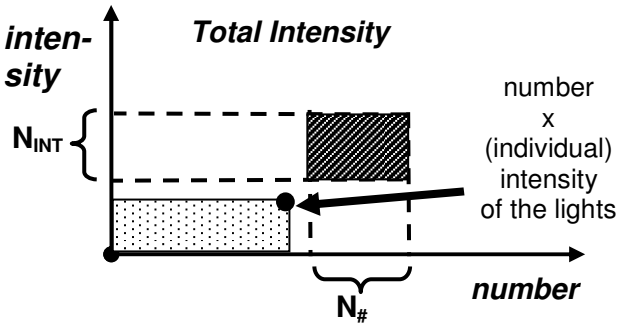
$= \exists \text{DIM} = \text{DIM}_1 \times \text{DIM}_2\ [N_{\#} \subset \{d_1: \text{MEAS}_{\text{DIM1}}(\text{the holes}) \geq d_1\}$
$\wedge\ N_{\text{SIZE}} \subset \{d_2: \forall x \in \text{the holes}[\text{MEAS}_{\text{DIM2}}(x) \geq d_2]\}]$

Here, Meas introduces some dimension *DIM*, which we interpret as total area. *DIM* is then factored down into its two component dimension DIM_1 and DIM_2, allowing *many* and *large* to be predicated of intervals on their respective scales; here, note that the second dimension (size) distributes over the elements of *the holes*. The final representation describes the situation in (31).

The derivation proceeds identically in the case of *few* and a negative adjective, with the exception that here the relevant two-dimensional interval is stated to be small (defined as excluding the compound neutral range):

(33) The lights in the room were few and dim

(34)



(35) $[\![\text{few and dim}]\!]\ (\ [\![[_{\text{MeasP}}\ \text{Meas [the lights]}]]\!]\ )$

$= \exists \text{DIM}\ [\ [\![\text{few and dim}]\!]\ (\lambda d{=}d_1 \times d_2.\text{MEAS}_{\text{DIM}}(\text{the lights}) \geq d)]$

$= \exists \text{DIM}{=}\text{DIM}_1 \times \text{DIM}_2\ [\ [\![\text{few}]\!]\ (\lambda d_1.\text{MEAS}_{\text{DIM1}}\ (\text{the lights}) \geq d_1)$
$\wedge\ [\![\text{dim}]\!]\ (\lambda d_2.\forall x \in \text{the lights}[\text{MEAS}_{\text{DIM2}}\ (x) \geq d_2])]$

$= \exists \text{DIM}{=}\text{DIM}_1 \times \text{DIM}_2\ [N_{\#} \subset \text{INV}(\{d_1\text{: MEAS}_{\text{DIM1}}(\text{the lights}) \geq d_1\})$
$\wedge\ N_{\text{INT}} \subset \text{INV}(\{d_2\text{: }\forall x \in \text{the lights}[\text{MEAS}_{\text{DIM2}}(x) \geq d_2]\})]$

$= \exists \text{DIM}{=}\text{DIM}_1 \times \text{DIM}_2\ \ [N_{\#} \subset \{d_1\text{: MEAS}_{\text{DIM1}}(\text{the lights}) \leq d_1\}$
$\wedge\ N_{\text{INT}} \subset \{d_2\text{: }\forall x \in \text{the lights}[\text{MEAS}_{\text{DIM2}}(x) \leq d_2]\}]$

Again, the result of this derivation matches the situation depicted in (34).

Before moving on, let me briefly examine the 'causal' conjunctions exemplified in (19). Consider again one of these examples, repeated below:

(36) The clothes you pack should be few and versatile

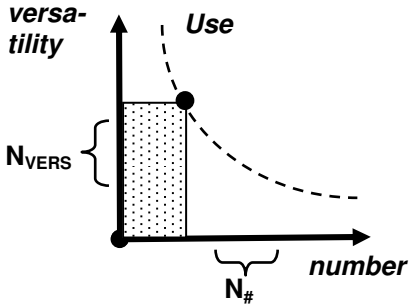
As discussed earlier, the relationship in (36) between the dimensions of number and versatility has a causal flavor: the clothes you pack must be versatile precisely because they must be few; if you could pack more, they would not need to be so versatile. As a first approximation we might capture this by allowing Meas to introduce a compound dimension that is factored into two causally related dimensions:

(37) $[\![\text{Meas}]\!]\ (X) = \lambda d.\text{Meas}_{\text{DIM}}(X) \geq d$, where $d{=}< d_1, f(d_1)>$

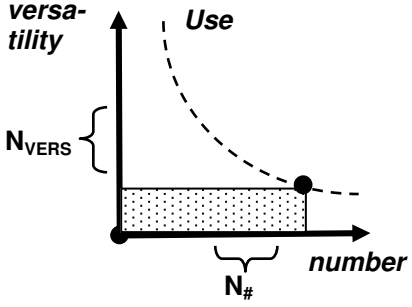
I believe, however, that it is possible to assimilate this type of conjunction to the multiplicative cases discussed above. To continue with this specific example, we may again interpret the number and the versatility of the clothes as two components of a

compound dimension that we might loosely describe as 'use' (i.e. the use one gets from a set of clothes is a function of the number of items and the versatility of each). Then if we hold use constant (say, at what we need for our trip to Bermuda), then number of clothes is inversely correlated to their versatility: the fewer the clothes, the more versatile they must be to yield the same use. *Few and versatile* can then be interpreted as positioning the subject along the curve that results; (36) asserts that the situations should be that in (38a), not that in (38b):

(38) a.



b.



The causal cases are thus a special case of the multiplicative cases discussed earlier, one in which the value of the primary dimension is held fixed.

Let us take stock of where we are. The predicate-of-degrees analysis developed in this section provides a framework that allows an account of Q-adjective/adjective conjunctions, which can be analyzed as predicates of 'intervals' on the scale of some compound dimension. Furthermore, and importantly, the constraints on this construction, which were puzzling under the predicate-of-individuals analysis, now receive a principled explanation. First, only gradable adjectives can be conjoined with Q-adjectives, because gradability is necessary to introduce a dimension that can combine with number to produce the required compound dimension. Secondly, a relationship must exist between number and the dimension associated with adjective; otherwise, it is not possible to infer the appropriate compound dimension.

To better appreciate this latter point, contrast the representations that we derive for a Q-adjective/adjective conjunction (as in (33)) and the equivalent sentential conjunction:

(39) a. The lights in the room were few and dim

b. $= \exists DIM{=}DIM_1 \times DIM_2\ [\ N_\# \subset \{d_1\text{: } MEAS_{DIM1}\text{ (the lights)} \leq d_1\}$
$\wedge\ N_{INT} \subset \{d_2\text{: } \forall x \in \text{the lights}[MEAS_{DIM2}(x) \leq d_2]\}]$

(40) a. The lights in the room were few, and they were dim

b. $\exists DIM_1[N_\# \subset \{d_1\text{: } MEAS_{DIM1}\text{(the lights)} \leq d_1\}] \wedge \exists DIM_2\ [N_{INT} \subset \{d_2\text{: }$
$\forall x \in \text{the lights}[MEAS_{DIM2}(x) \leq d_2]\}]$

(39b) and (40b) are truth conditionally equivalent; but the former imposes the additional condition that the two dimensions be interpretable as components of some compound

dimension. It is this that is responsible for the second of the constraints on conjunction discussed above (though we will see below that there is something to be said about the treatment of the gradable adjective *small* in (40b)).

5 Some Consequences

It has perhaps not escaped notice that the analysis presented in Section 4 rests on some non-standard assumptions about the semantics of gradable adjectives, and of conjunction. I turn to this now.

Most importantly, the preceding analysis requires that in conjunction with Q-adjectives, gradable adjectives must also be interpreted as predicates of scalar intervals; that is, they too require a predicate-of-degrees analysis. On the surface incompatible with the standard view of gradable adjectives as predicates of individuals (per (6) above). But importantly, this possibility is independently motivated. Examples such as the following demonstrate that a gradable adjective can be predicated of a degree (41), or of a dimension associated with an individual (42), rather than the individual itself:

(41) a. Six feet is tall (cf. Fred is tall)
b. Fifty dollars is expensive (cf. that shirt is expensive)

(42) a. John's **tall height** made him a natural choice for the basketball team
b. Although the **size** of the stains was **small**, they were so obvious that I couldn't wear the shirt
c. Fred was wise despite his **young age**

We therefore must have a secondary interpretation for gradable adjectives, as in (43b):

(43) a. $[\![\text{expensive}_{<d,et>}]\!] = \lambda d \lambda x.\text{COST}(x) \geq d$
b. $[\![\text{expensive}_{<d,<dt,t>>}]\!] = \lambda d \lambda I_{\text{COST}}.d \in I$

One might ask, then, whether the same sort of ambiguity could be present in the case of Q-adjectives. That is, could both the predicate-of-individuals and predicate-of-degrees accounts be correct? The answer, I would argue, is no. Using occurrence in the small-clause complement of *consider* as a test for predicative interpretations, the contrasts in (44) suggest that gradable adjectives have both predicate-of-individuals and predicate-of-degrees interpretations, while Q-adjectives have only the latter (though the precise reason for the ungrammaticality of (44c) requires further investigation).

(44) a. I consider the shirt expensive
b. I consider fifty dollars expensive
c. *I consider the guests many
d. I consider fifty many

A second question arises regarding the semantics of *and*. In the Q-adjective/adjective conjunctions under consideration, *and* cannot be analyzed in terms of set intersection; *many and large* is not the intersection of sets denoted by *many* and *large*. Rather, the effect of the conjunction is to form the set product of two degree predicates, though the result of this is ultimately expressed in terms of Boolean conjunction. Again this possibility is found elsewhere in the grammar; in particular, Heycock & Zamparelli (2005) show that NP conjunctions such as *father and grandfather* in (45) must be analyzed as involving an operation of set product formation:

(45) My father and grandfather were both sailors

In short, Q-adjective/adjective conjunctions not only provide evidence as to the correct semantic analysis of the Q-adjectives *many* and *few*, but also shed light on the interpretive possibilities available to ordinary gradable adjectives, and to conjunction.

6 Conclusions

I began this paper with an exploration of a little-studied type of conjunction, and a question about the correct semantic analysis of the adjectives of quantity *many* and *few*. I have shown that a pattern of constraints on the conjunction of Q-adjectives and ordinary adjectives can be explained by analyzing the former as predicates of scalar intervals. The facts from this small domain thus add to other evidence supporting the predicate-of-degrees account of Q-adjectives over the predicate-of-individuals account. This analysis further highlights the availability of a similar interpretation for gradable adjectives. Degree predication, as we might call this phenomenon, is thus one means by which natural language expresses quantity and degree.

Some questions arise from this analysis. What other types of expressions might have predicate-of-degrees interpretations? Cardinal numbers and vague quantity nominals such as *a lot* are obvious candidates, but only a fuller investigation will show if this is correct. And to the extent that an intepretation at this type is available to gradable adjectives, how is this constrained? I must leave these as questions for future study.

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Quantification into Quotations: Evidence from Japanese wh-doublets *

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Abstract

Contrary to what has been widely assumed, this paper argues that quantification into quotations is possible. In particular, it is shown that quantification over expressions, or *metalinguistic quantification*, is attested in natural language quotations. The empirical evidence comes from Japanese wh-doublets, which only appear in quotations and which are interpreted as indefinites ranging over expressions.

1 Introduction

It is a widely entertained presumption that quotation is a "sanctuary" in some respects in that certain operations applicable in ordinary contexts cannot be performed in quotations (Quine, 1960, 1966; Cappelen and LePore, 2007; Maier, 2007, among others). For instance, co-referential terms cannot be substituted for one another in quotations. Thus, even if 'Cicero' and 'Tully' denote the same individual, the truth conditions of the following sentences are different. Namely, while (1a) is true, (1b) is false. This is called *referential opacity* (or *non-indiscernability of identicals*).

(1) a. 'Cicero' contains 6 letters.
b. 'Tully' contains 6 letters.

Also, it is often assumed that quantification into quotations is not possible. For example, even though (2a) is true, existential generalization obtained from it does not preserve

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the truth condition, and (2b) is false since 'x' contains only one letter. This is called *quantificational opacity*.

(2) a. "Cicero" contains 6 letters
b. $\exists x$: 'x' contains 6 letters

While the referential opacity of quotations seems to be undeniable, this paper claims that the quantificational opacity of quotations is too strong. In particular, it will be shown that quantification over expressions into quotations (or *metalinguistic quantification*) is permitted in natural language (see Kaplan, 1968/69, 185ff for a similar view). Thus, the above existential generalization is legitimate if (2b) is interpreted as 'for some expression x: 'x' contains 6 letters.'

Empirical evidence for this claim comes from the Japanese wh-doublets listed in (3). It will be argued that their semantics exemplifies metalinguistic quantification.[1]

(3)

a.	dare-dare	'who-who'
b.	nani-nani	'what-what'
c.	itsu-itsu	'when-when'
d.	doko-doko	'where-where'
e.	dore-dore	'which-which'
f.	ikura-ikura	'how.much-how.much'
g.	ikutsu-ikutsu	'how.many-how.many'

The main claims put forward in this paper are the following: (i) that wh-doublets only appear in quotations and (ii) that they are semantically indefinites over (referring) expressions, which will be discussed in §2 and §3 respectively. §4 presents a compositional Heimian-Kratzerian fragment where metalinguistic quantification together with metalinguistic predication is possible, and where the semantics of wh-doublets is formulated as generalized quantifiers over expressions. §5 looks at additional data and §6 concludes the paper.

2 Distribution

Unlike wh-singlets, wh-doublets in Japanese do not have wh-interpretations, but are interpreted as a kind of indefinite, similar to English *such-and-such* and *so-and-so*, although probably not exactly the same.[2] Syntactically too, their distribution is markedly limited in comparison to wh-singlets. For example, ordinary matrix contexts almost never license wh-doublets, and the following examples are just uninterpretable.

[1] Some (perhaps most) dialects of Japanese have another use of wh-doublets as (distributive) plural indeterminate pronouns, probably in addition to the use reported here. The Tokyo dialect lacks this use entirely and we will ignore it throughout this paper.

[2] Note that not all wh-singlets have the corresponding wh-doublet. I will not discuss this morphological gap in this paper.

(4) a. *Bill-ga **nani-nani**-o katta.
Bill-NOM what-what-ACC bought
b. ***Dare-dare**-ga Bill-o aishiteiru.
who-who-NOM Bill-ACC love

The rest of this section defends the following distributional generalization by looking at various contexts where quotations occur.

(5) Japanese wh-doublets only appear in quotations.

Before proceeding to the discussion, it should be noted that as this section is devoted to the syntactic distribution of the wh-doublets, the English translations of the examples are left schematic and each wh-doublet is just replaced by '*X*'. As suggested above, wh-doublets are semantically a kind of indefinite and the details of the semantics will be dealt with in §3.

2.1 Quotations of properties

One kind of quotation that is readily identifiable is those where some property or properties of the quoted expression are talked about. Let us call them *quotations of properties*. The following sentences are examples of quotations of this type.

(6) a. "Eat a hamburger" is a VP.
b. "She" is nominative.

The following examples demonstrate that the wh-doublets are licensed in quotations of properties, as we expect from our generalization (5).[3]

(7) a. "**Nani-nani**-o taberu"-wa doushiku-da.
"what-what-ACC eat"-TOP VP-is
' "*X*-o taberu" is a VP.'
b. "**Nani-nani**-ga"-wa shukaku-o uketeiru.
"what-what-NOM"-TOP nominative.case-ACC receives
' "*X*-ga" is marked nominative.'

2.2 Quoted questions

Quotations that appear as complement clauses of certain predicates also license the wh-doublets. In Japanese, however, embedded declarative sentences are generally am-

[3]Any quotation containing a wh-doublets is semantically ambiguous in whether the wh-doublet is just mentioned/quoted or interpreted. When quoted, there is no distributional restriction such as (5), as quotations can contain any expression, grammatical or ungrammatical. For the moment, I ignore the quoted reading and we will come back to this in fn.9.

biguous between quotations and indirect speech, since both are accompanied by the complementizer *to* (cf. Maynard, 1984).[4]

Fortunately, unlike declaratives, quoted questions are distinguished from indirect questions on the surface. Namely, quoted questions are accompanied by *to* in addition to the question particle *ka*, while indirect questions appear without *to*. Thus, (8a) does not entail (8b) or vice versa, while if it were not for *to*, the entailments would go through.

(8) a. John-wa [Bill-to-Mary-ga atta **ka to**] kiita.
John-TOP [Bill-and-Mary-NOM met Q C] asked
'John asked "Did Bill and Mary meet?".'
b. John-wa [Mary-to-Bill-ga atta **ka to**] kiita.
John-TOP [Mary-and-Bill-NOM met Q C] asked
'John asked "Did Mary and Bill meet?".'

The following example demonstrates that wh-doublets are licensed in quoted questions but not in indirect questions.

(9) John-wa [kinoo **dare-dare**-ga kita ka *(to)] kiita.
John-TOP [yesterday who-who-NOM came Q C] asked
'John asked "Did *X* come yesterday?".'

2.3 Honorifics

Thirdly, honorific verbs can be used as a test for quotations. In Japanese, the predicate of a sentence takes the honorific form when the subject of the predicate is socially superior to the utterer. In the case of quotation, unsurprisingly, the attitude is not taken to be the actual utterer's but the original speaker's.

Imagine Lisa is Homer's daughter and Lenny is his friend.[5] While Lisa and Homer are family and hence she does not use honorifics when her father is the subject, she does use them when Lenny is, who is her father's friend and by assumption socially superior to her. In contrast, Homer and Lenny do not use honorifics for each other or for Lisa, who is socially inferior to both of them. In this context, if Homer reports Lisa's utterance with a sentence in which the subject of the embedded predicate is Lenny and the embedded predicate is in the honorific form, the embedded sentence is guarantee to be a quotation. As we expect, wh-doublets can appear in such a context, as the following examples demonstrate.

(10) a. Homer: Lisa-wa [Lenny-san-ga **doko-doko**-ni irasshatta to] itta.
Lisa-TOP Lenny-Mr.-NOM where-where-to was.HON C said

[4]It is not clear whether *to* is always a complementizer, is ambiguous between a complementizer and a quotation marker, or is a completely different morpheme from either of them. Following the tradition in the syntactic literature, I gloss it as a complementizer in this paper.

[5]This example is adapted from Potts and Kawahara (2004).

'Homer: Lisa said "Lenny was at X".'

b. Homer: # Lisa-wa [Lenny-ga **doko-doko**-ni ita to] itta.
Lisa-TOP [Lenny-NOM where-where-to was C] said
'Homer: Lisa said "Lenny was at X".'

The infelicity of (10b) is explained as follows: the wh-doublet in (10b) forces the embedded clause to be a quotation, and as a consequence it entails Lisa did not use the honorific form of the verb, which is pragmatically infelicitous given the above context.

2.4 Multi-lingual sentences

Multi-lingual sentences unambiguously involve a quotation, since foreign sentences cannot be embedded.

(11) a. Galileo said [that the earth moves].
b. *Galileo said [that eppur si muove].
c. Galileo said "Eppur si muove".

In accordance with our generalization in (5), wh-doublets can appear among embedded foreign words.

(12) Galileo-wa [**nani-nani** si muove to] itta.
Galileo-TOP "what-what si muove" C said
'Galileo said "X si muove".'

2.5 Adverbial quotations

It has been observed that quotations can be introduced by non-embedding verbs such as 'sigh', whereas indirect speech always requires a predicate that takes a clause as an argument. Our prediction is that wh-doublets can appear in a clause modifying a non-embedding verb, which is borne out.

(13) [John-wa watashi-dewa naku, **dare-dare**-o aishiteiru to], Hanako-wa
[John-TOP me-CT not.and, who-who-ACC love C], Hanako-TOP
tameikiohaita.
sighed
'Hanako sighed, "John loves X, not me".'

2.6 Root phenomena

There are certain phenomena in perhaps any language which are only observed in matrix contexts, or *root phenomena*. One exception of this restriction is quotations, since quotations are syntactically not embedded (cf. Shibatani, 1978). Our generalization in

(5) predicts that wh-doublets are compatible with clause-mate root phenomena. This prediction is borne out as the grammaticality of the following sentences indicates.

(14) a. John-wa Bill-ni [**nani-nani**-o **yome** to] itta.
John-TOP Bill-to [what-what-ACC read.IMP C] said
'John said to Bill, "Read *X*!".'

b. Bill-wa [John-**wa** sonogo **doko-doko**-e itta to] itta.
Bill-TOP [John-TOP after.that where-where-to went C] said
'Bill said "John(TT/CT) went to *X* after that".'

c. Bill-wa Mary-ni [**dare-dare**-wa kuru **no** to] kiita.
Bill-TOP Mary-to [who-who-TOP come Q C] asked
'Bill asked Mary, "Will *X* come?".'

d. Bill-wa [**dare-dare**-ga hon-o katta **ne/sa/yo** to] itta.
Bill-TOP [who-who-NOM book-ACC bought PRT C] said
'Bill said "*X* bought a book".'

e. Bill-wa [**dare-dare**-ga hon-o **kaimashita** to] itta.
Bill-TOP [who-who-NOM book-ACC bought.POLITE C] said
'Bill said "*X* bought a book".'

f. Bill-wa [**nani-nani**-o kau, **John-ga** to] itta.
Bill-TOP [what-what-ACC buy, John-NOM C] said
'Bill said "John buys *X*".'

Specifically, (14a) involves an imperative as the embedded clause, which is widely assumed to be non-embeddable (cf. Han, 1998; Schwager, 2005). Likewise, the topic phrase *John-wa* in (14b) can be interpreted as a thematic topic or as a contrastive topic, the former of which only occurs in root contexts. (14c) and (14d) use as tests particles whose occurrences restricted to root contexts, namely the question particle *no* and the declarative particles *ne, sa* and *yo*. Similarly, the polite forms of predicates are known to be limited to root clauses, and also rightward scrambling is a canonical root phenomenon. As expected, these are all compatible with clause-mate wh-doublets.

2.7 Interim summary

From the data presented in this section, we conclude that our generalization in (5) is correct, and the distribution of the wh-doublets is limited to quotational contexts. Now, we will turn to their semantics in the next section.

3 Semantics of Wh-doublets

In the previous section, we have established that the Japanese wh-doublets only appear in quotations. Quite interestingly, however, they semantically behave as if they are not quoted. Rather, they are interpreted as a 'place holder' for some other expression.

Then, instead of what do they appear? The following examples demonstrate that wh-doublets can only appear in place of referring expressions (except for *nani-nani* 'what-what'. see §5.1). That is, the sentence in (15) can report John's utterances in (16), but not those in (17).

(15) John-wa "Bill-ga **dare-dare**-o aishiteiru" to itta.
John-TOP "Bill-NOM who-who-ACC love" C said
'John said "Bill loves *X*".'

(16) a. John: Bill-ga **Mary**-o aishiteiru.
Bill-NOM Mary-ACC love
'John: Bill loves Mary.'
b. John: Bill-ga **sono onna**-o aishiteiru.
Bill-NOM that woman-ACC love
'John: Bill loves that woman.'
c. John: Bill-ga **bokuno imooto**-o aishiteiru.
Bill-NOM my sister-ACC love
'John: Bill loves my sister.'

(17) a. John: Bill-ga **dareka**-o aishiteiru.
Bill-NOM someone-ACC love
'John: Bill loves someone.'
b. John: Bill-ga **takusanno onna**-o aishiteiru.
Bill-NOM many women-ACC love
'John: Bill loves many women.'
c. John: Bill-ga **minna**-o aishiteiru.
Bill-NOM everyone-ACC love
'John: Bill loves everyone.'

To make the situation more complicated, although they appear in place of referring expressions, wh-doublets themselves behave like indefinites in that they show scope ambiguity with scope bearing elements in the non-quotational portion of the sentence. This is demonstrated by the following examples.

(18) a. Sanbunnoichi-no hito-dake-ga **Bill**-o aishiteiru.
1/3-GEN person-only-NOM Bill-ACC love
'Only one third of the people love Bill.'
b. Sanbunnoichi-no hito-dake-ga **dareka**-o aishiteriu.
1/3-GEN person-only-NOM someone-ACC love
'Only one third of the people love someone.'
(i) only 1/3 > someone
(ii) someone > only 1/3
c. Sanbunnoichi-no hito-dake-ga "**dare-dare**-ga kuru" to itta.
1/3-GEN person-only-NOM "who-who-NOM come" C said
'Only one third of the people said "*X* will come".'
(i) only 1/3 > dare-dare

(ii) dare-dare > only 1/3

The referring expression *Bill* in (18a) does not show scope ambiguity, while the indefinite *dareka* 'someone' in (18b) does with respect to the subject *sanbunnoichi-no hito-dake-ga* 'only 1/3 of the people'. Just like the latter, the wh-doublet *dare-dare* 'who-who' in (18c) exhibits scope ambiguity. Namely, in the narrow scope interpretation of the subject, the one third of the people uttered the same sentence and the rest of the people could have uttered something else or possibly did not utter anything, whereas in the wide scope interpretation of the subject, the sentence is interpreted as saying that one third of the people uttered sentences of the form *X-ga kuru* where the part indicated by X can differ among them. In this respect, wh-doublets themselves are similar to indefinites.

In order to account for this dual semantic nature of wh-doublets, I propose that they are indefinites over referring expressions and thus, their semantics involves existential quantification over expressions. More concretely, (15), for instance, would be interpreted as follows.

(19) ⟦John said "Bill loves WHO-WHO"⟧=
$\exists X$: X refers to a person & John uttered ⌜Bill loves X⌝.

This type of quantification is, however, not possible in the standard ontology of model theoretic semantics. Most notably, in our semantics of wh-doublets, model theoretic entities that the existential quantifier ranges over have to be something that itself has an interpretation. The next section proposes a new theory in which this is made possible.

4 A Metalinguistic Fragment

This section presents a modeltheoretic treatment of the metalinguistic semantics of wh-doublets proposed in the previous section. The model theoretic fragment in which this semantics is formulated is an extension of the type-driven compositional semantics advocated by Heim and Kratzer (1998). Specifically, it allows predication and quantification over expressions in addition to the familiar application and abstraction over individuals and their sets of all orders.

Firstly, the type of expressions u is added to the ontology (cf. Maier, 2007; Potts, 2005, 2007). Throughout the paper, intensionality is ignored to simplify the exposition.

(20) *The set of types:* $\mathcal{T}$
a. $e, t, u \in \mathcal{T}$ (basic types)
b. $\sigma, \tau \in \mathcal{T} \vdash (\sigma\tau) \in \mathcal{T}$ (functional types)
c. Nothing else is a type.

(21) *Domains*
a. D_e is the set of individuals

b. D_t is the set of truth values, $\{0, 1\}$
c. D_u is the set of expressions
d. $D_{(\sigma\tau)} = D_\tau^{D_\sigma}$

I assume that D_u contains any "expression", simplex or complex, interpretable or uninterpretable, linearly ordered strings of symbols or hierarchically structured objects, etc.[6] In this setting, the interpretation function $[\![\ ]\!]$ can be conceived of as a partial function from D_u to $\bigcup_{\tau\in\mathcal{T}} D_\tau$. This is a partial function since there are uninterpretable expressions in D_u which can still be quoted.

Furthermore, I assume that $[\![\ ]\!]$ is relativized to two functions, $\mathcal{Q}$ and g, where $\mathcal{Q}$ is a total function over D_u, and g is an ordinary assignment function from indices to $\bigcup_{\tau\in\mathcal{T}} D_\tau$.

Now, let us introduce a new compositional rule to allow metalinguistic predication first.

(22) *Metalinguistic Functional Application (MFA)*
If α has β and γ as its daughters, and $[\![\beta]\!]^{\mathcal{Q},g}$ is of type $(u\tau)$ for some type τ, then $[\![\alpha]\!]^{\mathcal{Q},g} = [\![\beta]\!]^{\mathcal{Q},g}(\mathcal{Q}(\gamma))$.

This rule states that when there is a predicate that takes an expression, the sister node of that predicate will not be interpreted (ignore $\mathcal{Q}$ for the moment). Thus, MFA comes into play when there is a predicate such as 'is a noun phrase' or 'say', whose lexical entries are given below. Note that I am assuming a separate lexical entry for the following quotational 'say' from the one for the familiar propositional 'say' (cf. Potts, 2007; Seymour, 1994).[7]

(23) a. $[\![\text{is a noun phrase}]\!]^{\mathcal{Q},g} = \lambda X_u.\ X$ is a noun phrase.
b. $[\![\text{say}]\!]^{\mathcal{Q},g} = \lambda X_u.\lambda y_e.\ y$ utters X.

The following is the rule that together with MFA allows quantification over expressions.

(24) *Metalinguistic Predicate Abstraction (MPA)*
If α has an index $\langle i, u\rangle$ for some integer i and β as its daughters, then $[\![\alpha]\!]^{\mathcal{Q},g} = \lambda X_u.[\![\beta]\!]^{\mathcal{Q}^{X/\langle i,u\rangle},g}$.

What this rule does is to modify the function $\mathcal{Q}$. I assume complex indices represented as ordered pairs of an integer and a type (cf. Heim and Kratzer 1998, 213). $\mathcal{Q}^{X/\langle i,u\rangle}$ denotes that function possibly different from $\mathcal{Q}$ at most in that it assigns X to $\langle i, u\rangle$.

[6] I abstract away from the complications this assumption brings into the theory. See Cappelen and LePore (2007, §3.4, fn.10), Postal (2004) for discussions.

[7] Usually, when one utters some expression, she stands in a certain relation (saying, demanding etc.) with the meaning of that expression. For example, that John said "Bill loves Mary" seems to entail that John said that Bill loves Mary. However, this does not always hold (see the examples in von Fintel, 2004, where foreign words or non-words are involved). Following von Fintel (2004), I leave this inference entirely to pragmatics. I thank Michela Ippolito for a discussion on this, although we did not fully agree with each other.

The function $\mathcal{Q} : D_u \rightarrow D_u$ is a substitution function that replaces traces marked with indices with expressions and is defined as follows.

(25) If $\mathcal{Q} = [i \rightarrow x, j \rightarrow y, k \rightarrow z, ...]$ where $i, j, k, ...$ are indices with type u, then $\mathcal{Q}(\alpha) = \alpha[x/t_i, y/t_j, z/t_k, ...]$

Here, $\alpha[x/t_i, y/t_j, z/t_k, ...]$ is meant to be the expression obtained from α by replacing every occurrence of $t_i, t_j, t_k, ...$ in α by $x, y, z, ...$ respectively. Note that under the present analysis, the quotation marks " " can be construed as indicating an application of the function $\mathcal{Q}$.

In this system, the denotations of the wh-doublets can be represented as generalized quantifiers over type u elements with existential force.[8] Schematically, it looks as follows.

(26) $[\![\text{wh-wh}]\!]^{\mathcal{Q},g} = \lambda P_{(ut)}.\exists X_u, \mathcal{Q}', g' : [\![X]\!]^{\mathcal{Q}',g'} \in D_e \wedge R([\![\text{X}]\!]^{\mathcal{Q}',g'}) = 1 \wedge P(X) = 1.$

'$[\![X]\!]^{\mathcal{Q}',g'} \in D_e$' in this representation ensures that X is a referring term. R here is an inherent restriction of the wh-doublet (e.g. *person'* for *dare-dare* 'who-who', and *place'* for *doko-doko* 'where-where'). I assume that the first argument P of type (ut) is derived by covert Quantifier Raising (QR) of the wh-doublet which leaves a trace with an index $\langle i, u \rangle$ for some integer i.[9]

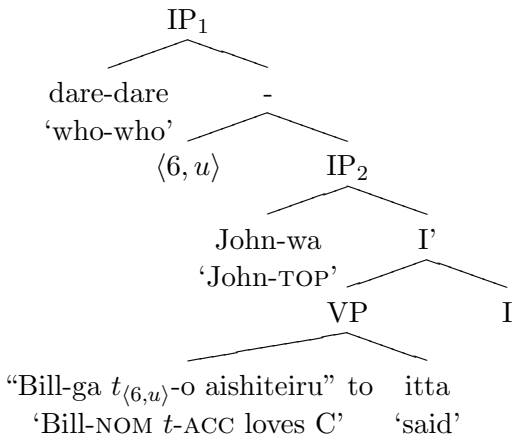
As an illustration, let us look at the sentence in (15) repeated here with a more accurate translation. The LF representation with the wh-doublet QR'd looks like (28) and this structure is interpreted as in (29).

(27) John-wa "Bill-ga **dare-dare**-o aishitieru" to itta.
John-TOP "Bill-NOM who-who-ACC love" C said
'For some expression X such that X denotes a person, John said "Bill loves X".'

[8] This way of treating indefinites is probably too simple given the issues such as quantificational variability and specificity, but I believe that implementing it in other approaches (e.g., choice functions, generalized Skolem functions, ∃-closure, etc.) is not particularly difficult using the ingredients given here.

[9] Recall that a quotation containing a wh-doublet is ambiguous in that the wh-doublet is used as a metalinguistic indefinite or just quoted, as noted in fn.3. The quoted interpretation can be captured by assuming that the relevant QR is optional. In order for this to work, furthermore, it is crucial to assume that QR is not triggered in semantics (e.g. by type-mismatch), but is a purely syntactic operation. However, I must defer the discussion of possible ramifications of this assumption to another occasion.

(28)



(29) $[\![(15)]\!]^{\mathcal{Q},g} = [\![\text{who-who } \langle 6,u\rangle \text{ John said "Bill-ga } t_{\langle 6,u\rangle}\text{-o aishiteiru"}]\!]^{\mathcal{Q},g}$
$= [\![\text{who-who}]\!]^{\mathcal{Q},g}([\![\langle 6,u\rangle \text{ John said "Bill-ga } t_{\langle 6,u\rangle}\text{-o aishiteiru"}]\!]^{\mathcal{Q},g})$
$= [\![\text{who-who}]\!]^{\mathcal{Q},g}(\lambda X_u.[\![\text{John said "Bill-ga } t_{\langle 6,u\rangle}\text{-o aishiteiru"}]\!]^{\mathcal{Q}^{X/\langle 6,u\rangle},g}) = ...$
$= [\![\text{who-who}]\!]^{\mathcal{Q},g}(\lambda X_u.\text{john uttered } \ulcorner\text{Bill-ga } X\text{-o aishiteiru}\urcorner)$
$= \exists X_u, \mathcal{Q}', g' : [\![X]\!]^{\mathcal{Q}',g'} \in D_e \wedge \textit{person}'([\![X]\!]^{\mathcal{Q}',g'}) = 1 \wedge \text{john uttered } \ulcorner\text{Bill-ga } X\text{-o aishiteiru}\urcorner$

In this calculation, the predicate *itta* 'said' induces MFA and the quoted expression is fed into $\mathcal{Q}$, which has been modified by MPA triggered by the index $\langle 6,u\rangle$.

Note that by assuming $[\![t_{\langle i,u\rangle}]\!]^{\mathcal{Q},g}$ is undefined for any $i, \mathcal{Q}, g$, the wh-doublets are correctly prohibited to appear in non-quotational contexts.[10]

5 Further Data

This section looks at further data of wh-doublets and related expressions.

5.1 'Nani-nani'

Among the wh-doublets in (3), *nani-nani* 'what-what' has a wider range of distribution in that it can replace any expression.

(30) John-ga "Bill-ga **nani-nani**" to itta.
John-NOM "Bill-NOM what-what" C said
'John said "Bill blah-blah-blah".'

Thus, John's actual utterance reported by this sentence could contain, an adjective (e.g. *kashikoi* 'smart'), a verb phrase (e.g. *keeki-o tabeta* 'ate the cake'), a noun phrase and the

[10] I am indebted to Irene Heim for pointing out an inadequacy of my earlier formalization regarding this point.

copula (e.g. *sinyuu-da* 'is my best friend') etc, in the place of *nani-nani*. I propose that the semantics of *nani-nani* simply does not impose any restriction on the expressions that it ranges over, which looks as follows.

(31) $[\![\text{nani-nani}]\!]^{\mathcal{Q},g} = \lambda P_{\langle u,t\rangle}.\exists X_u : P(X) = 1.$

In fact, *nani-nani* is always employed in multi-lingual sentences like (11)[11], and generally can be used in place of the other wh-doublets.

5.2 Generic readings

Just like ordinary indefinites, wh-doulets show generic readings. This is especially prominent in quotations of properties.

(32) a. "**Nani-nani**-o taberu"-wa dooshiku-da.
"what-what-ACC eat"-TOP VP-is
'For X in general, "X-o taberu" is a VP'.
b. "**Nani-nani**-ga"-wa shukaku-o uketeiru.
"what-what-NOM"-TOP nominative.case-ACC receives
'For X in general, "X-ga" is marked nominative."

Of course, generic readings are not obligatory even in quotations of properties at least in certain pragmatic contexts.

(33) John-ga sonotoki itta "**dare-dare**"-wa ni-onsetsu-datta.
John-NON then said "who-who"-TOP two-syllable-was
'The expression X referring to a person which John uttered then was disyllabic.'

5.3 Wh-singlets

For most of the people I consulted, all the wh-singlets can be used in exactly the same way as the wh-doublets, which suggests that wh-singlets are lexically ambiguous between the metalingusitic interpretation and the ordinary interpretation as indeterminate pronouns. Note that the paradigm of wh-doublets is defective in that not all wh-singlets have the corresponding wh-doublets, such as *naze* 'why', and in such a case, the metalinguistic use of wh-singlets is particularly felicitous, as in the following sentence.

(34) John-wa "Mary-ga **naze** kita" to shuchooshi tsuzuketa.
John-TOP "Mar-NOM why came" C claim.INF continued

[11] Unless the speaker understands the foreign language. In that case, foreign expressions are in the domain of $[\![\ ]\!]^{\mathcal{Q},g}$ and the restrictions of the other wh-doublets can apply. What is assumed here is an internalist view of semantics in which the interpretation function $[\![\ ]\!]^{\mathcal{Q},g}$ is relativized to each speaker/I-language. I thank Kai von Fintel for pointing this issue out to me.

'John insisted "Mary came for such-and-such reason".'

5.4 Metalinguistic demonstrative expressions

As pointed out to me by Makoto Kanazawa (p.c.), expressions such as *kore-kore* 'this-this', *dore-sore* 'which-that', *kore-kore-kouiu* 'this-this-like.this', etc. have the same distribution and a similar semantics as the wh-doublets.

(35) a. Sensei-wa "**kore-kore**-o shinasai" to seito-ni itta.
teacher-TOP "this-this-ACC do.IMP" C student-to said
'For some expression X, the teacher said to the students "Do X".'
b. Sensei-wa "**dore-sore**-o tabenasai" to itta.
doctor-TOP "which-that-ACC eat.IMP" C said
'For some expression X, the doctor said "Eat X (among these)".'
c. Setsumeisho-ni "**kore-kore-kouiu** koto-ga dekiru" to kaitearu.
instruction-in "this-this-like.this thing-NOM possible" C written.down
'For some expression, the instruction says "things like X are possible".'

Mamoru Saito (p.c.) suggested to me the possibility that these items prefer the specific interpretations. In fact, they have certain additional meanings indicated in the translations in (35). I leave the precise characterizations of their semantics/pragmatics for future research.

5.5 Closed vs. open quotations

Lastly, it should be pointed out that the examples we have looked at so far only involve what Recanati (2000) calls *closed quotation*, which is contrasted with *open quotation* (aka *mixed quotation*). He claims they have basically different properties:[12]

(36) a. *Closed Quotation:*
A closed quotation is used as a singular term that refers to the expression enclosed by the quotation marks, and is entirely ignorant of the syntactic and semantic properties of the quoted expression. The entire sentence expresses that the quoted expression has such-and-such property or is used in such-and-such way.
b. *Open Quotation:*
The quoted material in an open quotation is used syntactically and semantically in an ordinary way, though it carries a certain connotation.

Interestingly, open quotations disallow wh-doublets.

[12] For similar ideas, see Abbott (2003); Geurts and Maier (2005); Partee (1973); Potts (2007); Stainton (1999).

(37) a. *Quine-niyoruto, inyoo-wa “**nani-nani**-no seishitsu-o
Quine-according.to quotation-TOP “what-what-GEN property-ACC
motteiru”.
have”
b. *Kono mondai-wa “**nani-nani**-no mondai”-no ichirei-da
this problem-TOP “what-what-GEN problem”-GEN example-is
c. *Kare-koso tenkeitekina “**doko-doko**-kara kita hito”-da.
he-FOC typical “where-where-from came person”-is

Thus, wh-doublets empirically support the distinction between the two types of quotation.

6 Conclusion

To briefly conclude, we have seen that the Japanese wh-doublets only appear in quotational contexts and that they are interpreted as indefinites that range over (referring) expressions, which suggests that their semantics exemplifies metalinguistic quantification. A theoretical implication of this is that quantification into quotations is not in fact prohibited in natural language, contrary to what has been widely believed, and at least metalinguistic quantification is attested in quotations.

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Article Use Across Languages: an OT Typology*

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Abstract

Many languages use definite and indefinite articles to signal the referential status of individuals in conversational space. But articles are not necessary to set up or maintain discourse reference, as witnessed by the fact that languages can also get by with bare nominals. Similarly, we find that many, but not all languages use a morphological singular/plural contrast to distinguish reference to atoms from reference to sums. We assume that an awareness of discourse reference and atomic/sum reference is part of universal human cognition. The balance between economy considerations (favoring bare nominals) and the desire to convey (discourse) referential distinctions determines whether these cognitive operations are reflected in the form nominals take in the language. A range of possible OT grammars is discussed, and exemplified. The cross-linguistic semantics of bare nominals is related to these grammars. Bare nominals have the interpretations that are not blocked by other, more specific forms.

1 Introduction

In languages like English, we use articles to set up referents in a conversational space, and to refer back to them (Kamp 1981, Heim 1982). Consider the examples in (1).

(1) a. A student$_i$ came to my office. She$_i$ had a question about the exam.

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b. A child$_i$ was playing in the park. The funny little creature$_i$ wore a green hat and purple socks.

The indefinite noun phrase *a student* (1a) sets up a referent in the universe of the discourse. This discourse referent has the properties of being a student and of having come to my office. Once a referent with such properties has been introduced, we can use a pronoun to refer back to it. Thus *she* in the subsequent sentence of (1a) is an anaphoric pronoun that refers back to the student who came into my office. Instead of a pronoun, we can also use a definite description to refer to a familiar discourse referent (1b). Definites convey uniqueness (singulars, examples in 1) or maximality (plurals, examples in 2). In anaphoric contexts such as (1), uniqueness or maximality is relativized to the discourse. In other contexts, world knowledge plays a role, as in (2).

(2) I love you more than the sun and the stars.

These informal descriptions of (1) and (2) imply that definite and indefinite articles play very specific roles in conversation, which are best evaluated at the discourse level. Rijkhoff (2002: 185) states that definite articles are localizing elements that express 'weak deixis' in the sense of Anderson and Keenan (1985: 261-2). Farkas (2002) develops a notion of dynamic uniqueness in Discourse Representation theory (DRT), which is labeled as 'determined reference'. Determined reference generalizes over uniqueness/maximality and anaphoricity, and requires that the value chosen for a discourse referent introduced by a definite NP at a certain point of update is fixed. All possible update functions extending the input context assign to the discourse referent the same individual in the model. Nominals with indefinite articles lack these features, and simply introduce a discourse referent (Kamp 1981, Kamp and Reyle 1993).

In languages like English, articles (and determiners more generally) are the prime expressions introducing discourse referents (cf. Kamp and Reyle 1993, Higginbotham 1985, Kamp and van Eijck 1997). The contrast between bare singulars and bare plurals in (3) suggests that plural morphology also plays a dynamic role.

(3) Mary ate *apple/an apple/the apple/apples/some apples/the apples.

Farkas and de Swart (2003) interpret plural morphology in terms of a predication of plurality over a discourse referent. In order to support such a predication, there must be a discourse referent available. Plural morphology thus presupposes a discourse referent. This presupposition can be bound by a determiner (*the, some*, etc.) or accommodated, which leads to the bare plural in (3).

So far, our examples have been chosen from English. Other languages that have articles or singular/plural morphology use these linguistic means to convey very similar meaning distinctions. This leads us to posit the following correspondence rules between forms and meanings:

- **Dr:** A determiner (form) corresponds with the presence of a discourse referent (meaning).
- **Def:** A definite article (form) corresponds with a discourse referent with determined reference (meaning).
- **Pl:** Plural morphology on the noun (form) corresponds with a predication of plurality on a presupposed discourse referent (meaning).

The correspondence between forms and meanings is quite stable across languages, but clearly, not all languages have definite/indefinite articles, or establish a singular/plural distinction in the morphology of the noun. Many languages do not mark the contrast between sum/atomic reference on the noun, and/or use *bare nominals*, i.e. noun phrases that lack an article or determiner in environments in which English would use a definite or indefinite noun phrase. Depending on the language, such a bare nominal may have a definite or an indefinite, a singular or a plural meaning. (4) illustrates this for Mandarin Chinese (the example is from Krifka 1995).

(4) Wò kànjiàn xióng le
I see bear ASP
'I see a bear/some bears/the bear(s)'

We assume that setting up referents in discourse space, and referring to them involve general cognitive operations, which are related to the way human beings organize the conversational space around the individuals that we talk about. Furthermore, we take everyone to possess the same cognitive abilities, independently of their mother tongue. In the face of such assumptions about general cognitive abilities, linguists wonder why certain languages (such as English) necessarily encode these cognitive operations in the functional structure of nominals, whereas other languages (such as Mandarin Chinese) do not. Proposals addressing this issue appeal to covert functional structure (Borer 2004) or parametric variation (Chierchia 1998a). These proposals have generated many new insights, but also face empirical and conceptual problems. For lack of space, we will not discuss these proposals here, but focus on an alternative line of explanation in terms of Optimality Theory (OT). We posit the correspondence rules **Dr, Def** and **Pl** as universal constraints on the mapping from meanings to forms. This implies that languages that have definite articles or a singular/plural contrast assign roughly the same meaning to these forms. However, languages do not need to use these forms to convey the relevant meanings. Language variation in the expression of plurality, discourse reference, and determined reference arises from the interaction of the mapping from meaning to form with a general economy constraint blocking functional structure in the nominal domain. Such an economy constraint favors bare nominals and nominals not marked for number over nominals with an elaborate functional structure. This economy constraint is also a rule of universal grammar, but it obviously conflicts with

the correspondence rules. The conflict is resolved by taking the correspondence rules from form to meaning to be soft, violable constraints, that are ranked with respect to each other, in an Optimality Theoretic way. The ranking is language-specific, and a range of possible grammars arises from this interaction. This idea is developed in Section 2. We know that bare nominals do not have the same meaning from one language to the next. In the absence of form carrying meaning, the correspondence rules do not have anything to say about the semantics of bare nominals. This leads to the idea that bare nominals can only have those meanings that are not blocked by more specific nominals in the language. Section 3 develops a cross-linguistic semantics of bare nominals that relies on the OT typology developed in Section 2.

2 Markedness and faithfulness in the nominal domain

As far as the syntactic structure of nominals is concerned, we assume that full DPs have the layered structure $[_{DP}\ [_{NumP}\ [_{NP}\ ]]]$. Articles, demonstratives, numerals and quantifiers reside in D. We try to avoid null elements in the functional projections Num and D in teh absence of evidence that they need to be projected. Whether nominals project at the functional levels of NumP and DP depends on the presence of number morphology on the noun and on the presence of articles or other determiners. All nominals project at least at the lexical level of NP. Thus nominals can have the structure of an NP (bare singulars), a NumP (bare plurals) or a DP (nominals with an article or some other determiner). Bare nominals constitute the unmarked form, because they have the simplest possible nominal structure. The OT grammar values this insight by means of a core markedness constraint, viz. *FunctN, which avoids all functional structure in the nominal domain:

- *FunctN: Avoid functional structure in the nominal domain.

*FunctN is motivated by economy: less functional structure is better than more. *FunctN is a gradable constraint, and each functional projection in the noun phrase presents a violation of the markedness constraint. In this section, we will present six classes of languages (labeled i-vi), based on six grammars in which the economy constraint *FunctN interacts with faithfulness constraints driving the expression of atomic/sum reference and discourse referential information. Reranking of constraints is driving the typology in an optimality-theoretic fashion.

If the constraint *FunctN is ranked higher than faithfulness constraints involving the expression of meanings that are characteristically expressed in the functional layer above NP (call them $FNom_{a...z}$), we obtain the ranking *FunctN >> {$FNom_a$, $FNom_b$, ... $FNom_z$}. Under this ranking, we have no singular/plural distinctions, no articles, no indefinite determiners (like *some, several*), no numerals (like *four, at least three*), and no D-quantifiers (like *every, most*). The mutual ranking of the constraints $FNom_a$, $FNom_b$, ... $FNom_z$ is irrelevant if all functional structure is blocked by the highly ranked

markedness constraint *FunctN. Arguably, this ranking would give us the perfectly unmarked nominal system. From the description of a wide range of languages as provided by the literature, we learn that most if not all natural languages have at least some level of functional structure in the nominal domain. Even if they don't have morphological number and do not use articles, they may have case marking, numerals, classifiers, demonstratives, quantifiers, or some other kind of functional structure. Example (5) (from Chierchia 1998b) shows this for Mandarin Chinese.

(5) liǎng zhāng zhuōzi
two CL table
'two (pieces of) table'

For reasons of space, we cannot address the full range of functional structure in this paper. The contrast between articles and other types of determiners suggests that articles have a special status among determiners. It is not always easy to determine which expressions living in D qualify as articles, and which do not. In the context of this paper, we take articles to be determiners that introduce a discourse referent (cf. the correspondence rule **Dr**), and possibly convey determined reference (cf. the correspondence rule **Def**), but do not contribute other quantificational/qualitative information. In order to reflect the special status of articles in the OT system, we formulate the constraint *Art that can be viewed as a special instance of the general markedness constraint *FunctN:

♦ *Art: Avoid article.

If *Art and *FunctN are ranked above faithfulness constraints governing article use and a reflection of the singular/plural distinction (collectively labeled as {$FNom_1$, $FNom_2$, ... $FNom_n$}, and to be spelled out in the remainder of this section), we don't see a formal reflection of plurality or information concerning discourse referential status conveyed by articles. Bare forms are used for definite, indefinite and kind reference, and do not display a singular/plural distinction, as illustrated by the Mandarin Chinese example (4) above. We may posit other faithfulness constraints not discussed in this article (collectively labelled as $FNom_x$) to reside below *Art, but above *FunctN, and which give rise to functional structure including demonstratives, classifiers, quantifiers, etc (cf. Example 5). Such languages as Japanese, Thai and Mandarin Chinese are then class (i) languages with the ranking *Art >> $FNom_x$ >> *FunctN >> {$FNom_1$, $FNom_2$, ... $FNom_n$}. Given that we do not address the nature of the constraints $FNom_x$ in this paper, we will leave them out of the rankings that build up the typology in this section.

Mandarin Chinese is a language without a formal reflection of the singular/plural distinction. But in many languages, number is marked in the morphology on the noun. As a default, plural will be marked first, if there is a number distinction at all (Greenberg 1963, Corbett 2000). In line with these observations, we posit a faithfulness constraint FPL, which picks up on the correspondence rule **Pl** formulated in Section 1.

♦ FPL: Plural predication on a (presupposed) discourse referent corresponds with an expression in Num.

Languages that rank FPL higher than *FunctN project at least a NumP for plural nouns. However, the expression of number in the morphology on the noun is not necessarily connected to article use. Languages that adopt the ranking FPL >> {*Art, *FunctN} >> {$Fnom_1$, $Fnom_2$, ... $Fnom_n$}, establish a formal distinction between singular and plural nouns, but definite and indefinite meanings as well as kind reference is expressed by bare nominals, i.e. nominals without an article (singulars and/or plurals). Relevant class (ii) languages are Hindi, Russian, Georgian. (6) provides an example from Georgian (from Harris (1981: 21-22, quoted by Rijkhoff 2002). The Russian example (7) is from Chierchia (1998a); Dayal (2004) discuss similar examples from Hindi.

(6) burtebi goravs
balls:PL:NOM roll:3SG
'Balls/the balls are rolling.'

(7) V komnate byli malcik I devocka.
In room were boy and girl
'In the room were a boy and a girl.'

Although the high ranking of *Art and *FunctN in class (i) and class (ii) languages is economical from the production perspective (it reduces speaker effort), it is not attractive from the comprehension perspective (it induces massive ambiguities for the hearer to resolve). As has been shown in the literature, bare nominals in Manarin Chinese, Hindi and Georgian lend themselves to definite, existential, and generic interpretations. Case marking, word order, lexical/prosodic information and other contextual clues may be exploited by the hearer to construct the optimal discourse interpretation of the nominal. But the interpretation process would be facilitated if some of these meaning distinctions would be reflected in the form of the nominal. This is the intuition underlying the faithfulness constraints FDEF and FDR, which mirror the correspondence rules **Def** and **Dr** introduced in Section 1 above.

FDEF requires the expression of determined reference. The prototypical way to realize determined reference is by means of a definite determiner, and for simplicity we will build this into the constraint.

♦ FDEF: Determined reference of a discourse reference corresponds with an expression of definiteness in D.

With the ranking FDEF >> *Art, we obtain a system that exemplifies an alternation between definites and bare nominals. Such class (iii) languages are Hebrew and

Bulgarian. The following Hebrew examples illustrate (8 is from de Swart, Winter and Zwarts 2007; 9 is from Doron 2004).

(8) dan ra'a namer
Dan saw tiger
'Dan saw a tiger.'

(9) namer/ ha-namer Hu xaya Torefe
tiger the-tiger Is animal carnivorous
'The tiger is a carnivorous animal.'

The bare singular gets an existential (8) or a generic interpretation (9). The definite singular gets a regular definite or a generic interpretation (9). Class (iii) languages have a stable system that reflects the asymmetry between definite and indefinite (or rather: non-definite) nominals defended in Farkas (2002, 2006) and Farkas and de Swart (2007, 2008), who maintain that the definite article marks determined reference, whereas non-definites are simply unmarked. If we posit FDEF as a relevant faithfulness constraint, we predict that languages typically oppose bare and definite nominals, but not bare and indefinite ones. This is in line with the typological literature (Greenberg et al. 1978). The semantic literature has emphasized that bare nominals (singular and plural), in languages in which they occur, always have an existential meaning (possibly besides definite and generic readings). The availability of an existential interpretation for bare nominals is common to class (i) to (iii) languages.

The introduction of faithfulness constraints concerning the referential status of the discourse referent should be viewed in the broader perspective of how discourse referents are introduced. Farkas and de Swart (2003) develop a more fine-grained version of Kamp and Reyle's (1993) Discourse Representational Theory, and introduce a distinction between discourse referents and so-called thematic arguments. Thematic arguments are the argument slots associated with nouns and verbs as they come out of the lexicon. Thematic arguments are part of DRS conditions, but are not members of the universe of discourse of the DRS, so they do not have dynamic force. At the compositional level of building predicate-argument structure, these thematic arguments must be instantiated by discourse referents. Farkas and de Swart (2003) develop modes of composition that place the burden of contributing discourse referents on the nominal. More precisely, the determiner introduces a discourse referent which instantiates the thematic argument of the noun in building the DP. When a DP in regular argument position combines with the verb, its discourse referent instantiates the thematic argument of the verb. A dynamic semantics of plural morphology allows bare nominals to introduce a discourse referent via accommodation of the presupposition introduced by the plural morphology (cf. Section 1). Not all languages allow this accommodation process, so we establish a distinction between "strong" plural morphology permitting to bare plurals in regular argument position (as in Germanic languages), and "weak" plural

morphology incapable of licensing a discourse referent in regular argument position (as in Salish, French, see below). In accordance with this view, we posit a constraint that requires discourse referents to be introduced by a strong functional layer above the NP. We label this constraint FDR.

- FDR: The presence of a discourse referent in the semantics corresponds with a strong functional layer above NP.

Languages that rank FDR below *FUNCTN don't require a functional layer above NP to parse discourse referents, so bare nominals are fully adequate in regular argument positions, as is commonly established for class (i) to (iii) languages. Class (iv) languages that adopt the ranking {FPL, FDR} >> {*Art, *FunctN} >> FDEF do not establish a definite/indefinite contrast, but use a determiner on all nominals in argument position. The Salish languages (a family of Amerindian languages spoken in Canada) exemplify this ranking. Matthewson (1998) provides examples from St'át'imcets, and points out that all argument nominals are introduced by an overt determiner (10).

(10) tecwp-mín-lhkan ti púkw-a lhkúnsa
buy.APPL-1SG.SUB DET book-DET today
'I bought a/the book today.'

According to Matthewson, the St'át'imcets determiners do not encode either definiteness or specificity, but 'assertion of existence'. She models this notion in DRT (Kamp and Reyle 1993). For our purposes, the notion of 'assertion of existence' can be identified with the introduction of a discourse referent. In St'át'imcets, morphological number is incapable of licensing a discourse referent, so we take this language to have a "weak" plural. Accordingly, the presence of an overt determiner is required, even in the plural (11) (cf. below for a treatment of French along similar lines).

(11) léxlex i smelhmúlhats-a
intelligent DET.PL woman(pl)-DET
'Women/the women are intelligent.'

The ranking {FPL, FDR} >> {*Art, *FunctN} >> FDEF postulated for St'át'imcets derives full DPs for inputs containing a discourse referent.

Languages that rank FPL, FDEF and FDR above *Art and *FunctN exemplify a full contrast between definite and indefinite forms. In line with Farkas and de Swart (2003), we assume that plural morphology on the noun may also be capable of licensing a discourse referent (see above). Assuming that singular nouns do not have a Num projection, but plural nouns do, we end up with the asymmetry between singular and plural nouns illustrated in (3) for English. Bare plurals occur in regular argument position, but bare singulars are blocked. If either Num or D is sufficient to introduce a discourse referent, class (v) languages end up with a system of definite and indefinite

articles in the singular, and an opposition between definites and bare nominals in the plural. This is the system characterizing English (but also Dutch, German, Norwegian, Swedish, Spanish, Italian). We illustrate this for Dutch in (12).

(12) Sanne kocht *appel/ een appel/ de appel/ appels/ de appels
Sanne bought *apple/ an apple/ the appel/ apples/ the apples
'Sanne bought *apple/an apple/the apple/apples/the apples.'

Tableaux 1 and 2 illustrate how the ranking {FPL, FDR, FDEF} >> {*Art, *FunctN} derives the possibility of bare plurals, but not of bare singulars in regular argument position (i.e. the variable *x* in the input stands for a discourse referent).

Tableau 1: blocking of bare singular in class (v) languages, illustrated with English (production).

Meaning ∃x Book(x)	Form	FPL	FDR	FDEF	*Art	*FunctN
	$[_{NP}$ book]		*			
	$[_{NumP}$ sg $[_{NP}$ book]]		*			*
☞	$[_{DP}$ a $[_{NumP}$ sg $[_{NP}$ book]]]				*	**

Tableau 2: bare plurals in class (v) languages, illustrated with English (production).

Meaning ∃x Book(x) & Pl(x)	Form	FPL	FDR	FDEF	*Art	*FunctN
	$[_{NP}$ book]	*	*			
☞	$[_{NumP}$ pl $[_{NP}$ book]]					*
	$[_{DP}$ indef $[_{NumP}$ pl $[_{NP}$ book]]]				*	**

In English-type languages, bare singulars are blocked, because of the ranking of FDR > {*Art, *FunctN}, as Tableau 1 illustrates. It does not help to project a NumP, because there is no singular morphology in English that is licenses a discourse referent. The only way to satisfy FDR with a singular, indefinite meaning in the input is to project an indefinite article *a* in D. As we see in Tableau 2, plural morphology in English is strong and satisfies FDR. The insertion of a plural indefinite article would constitute an unnecessary violation of *Art and *FunctN. The contrast between Tableaux 1 and 2 illustrates that the more economical bare form is preferred whenever it does not violate the higher ranked faithfulness constraints, even in languages with elaborate functional structure in the nominal domain. In OT terms, the English bare plurals constitute an instance of the 'emergence of the unmarked.'

If Num is not strong enough to introduce a discourse referent, we end up with a definite/indefinite contrast in the singular as well as the plural. An analysis in terms of

weak number has been defended for French (Delfitto & Schroten 1991). We label French a class (vi) language.

(13) J'ai lu *(un) livre/ *(des) livres.
I have read *(INDEF_SG) book/ *(INDEF_PL) books
'I read a book/books.'

The singular form *livre* and the plural form *livres* are pronounced in the same way, so they are phonetically indistinguishable. As a consequence of the weak number morphology on the noun, the French bare plural *livres* implies a violation of FDR, whereas its English counterpart *books* in Tableau 2 does not. Interestingly, we do not need additional constraints to account for this case: FDR allows number to introduce a discourse referent, but only if this functional projection is strong. The fact that class (vi) languages have weak number leads to a striking contrast between French and English as far as the possibility of having bare plurals is concerned. French is treated along the same lines as St'át'imcets (cf. 11 above).

The introduction of the constraint FDR completes the set of constraints we need to define our typology. We have seen so far that class (i) languages have the ranking {*Art, *FunctN} >> {FPL, FDEF, FDR}, but probably allow other faithfulness constraints to intervene between *Art and *FunctN. Thus they effectively introduce functional structure (classifiers, case marking, quantification) in the nominal domain (as in 5), without projecting number or using articles, though (cf. 4). Examples are Tai, Japanese and Mandarin Chinese. In the grammar of class (ii)-(vi) languages, various faithfulness constraints are ranked above the markedness constraints *Art and *FunctN, and more and more functional structure is created at the expense of the use of bare nominals. The result is summed up in Table 1.

Table 1: A typology of bare nominals, number morphology and articles

class	ranking	characteristics	example
(i)	{*ART, *FUNCTN} >>{FPL, FDEF, FDR}	no number, no articles	Chinese
(ii)	FPL >> {*ART, *FUNCTN} >> FDEF, FDR	sg/pl distinction, no articles	Georgian
(iii)	{FDEF, FPL} >> {*ART, *FUNCTN} >> FDR	sg/pl distinction, definite/bare contrast	Hebrew
(iv)	{FDR, FPL} >> {*ART, *FUNCTN} >> FDEF	no def/indef; no bare nominals (weak Num)	St'át'imcets
(v)	{FDR, FDEF, FPL} >> {*ART, *FUNCTN}	def/indef contrast, bare plurals OK (strong Num)	English, Dutch, etc.
(vi)	{FDR, FDEF, FPL} >> {*ART, *FUNCTN}	def/indef contrast, no bare nom. (weak Num)	French

In Class (i)-(iii) languages we find bare (singular) nominals in regular argument position; languages in class (iv)-(vi) exclude bare singulars. Whether bare plurals are allowed in these languages depends on the strength of number morphology (weak in St'át'imcets and French, strong in English).

Note that the faithfulness constraints do not interact with each other, so their mutual ranking above/below the markedness constraints *Art and *FunctN is irrelevant. There might be some interaction not visible from this table in that most languages that rank FDEF and/or FDR above *Art also rank FPL above *FunctN. One possible explanation is that higher levels of projection imply lower levels, so a full DP also has a NumP and an NP, and a NumP also has an NP. Corbett (2000: 278, 279) points out that some languages exemplify number distinctions for definites only (Kambera, Basque). In Kambera and Basque, the higher position of D (where the definite article lives) then drives the lower position of Num (where the singular/plural distinction is made) to be filled as well, but bare nominals unmarked for definiteness would not have to convey number information. In fact, this might imply a low ranking for FPL in these languages after all. We leave an elaboration of this idea for future work.

With this caveat, Table 1 represents a full factorial typology in the sense that all possible rankings of the constraints are illustrated, and we do not expect other grammars to be possible for natural language. Accordingly, we claim that the typology captures major classes of number morphology and article use in natural language. The only way to elaborate the classification is to add more constraints, that establish more fine-grained distinctions in the nominal domain (cf. our discussion of class i languages above). Such constraints are also needed to account for languages that have a morphological singular (but use the unmarked form for plural reference), or languages that have an indefinite, but not a definite article. We will leave this possibility for future research. The typology indicates that several distinctions are relevant, and their interaction in the grammar determines the distribution of bare nominals in the language. As a result, bare nominals in one language (belonging to one class) need not have the same range of meanings as bare nominals in another language (belonging to some other class). With the OT typology in place, it is possible to develop an account of the cross-linguistic semantics of bare nominals in terms of blocking.

3 Cross-linguistic semantics of bare nominals

The OT typology developed in section 2 allows us to recover the range of interpretations of a bare nominal in a language. The faithfulness constraints FPL, FDEF, and FDR mirror the correspondence rules developed in Section 1. Because of weak morphology and the high ranking of these constraints in (iv) languages like St'át'imcets and class (vi) languages such as French, no bare nominals are generated in regular argument position in these languages, as illustrated in (10, 11, 13). Thus the syntax-

semantics interface of these languages is fully explicit: syntactic projections and semantic interpretations are in perfect correspondence. But what about those languages in which the faithfulness constraints are outranked by *FunctN and *Art? These markedness constraints are operative in the syntax, but not in the semantics. No correspondence rules are defined for bare nominals, so what fixes their interpretation? We propose that bare nominals in class (i), (ii), (iii) and (v) languages get their interpretation by blocking.

3.1 Blocking interpretations

If we go up from the bottom of Table 1, we find bare plurals, but not bare singulars in regular argument position in class (v) languages (English, Germanic). We know that bare plurals in English have a non-definite or generic (plural) meaning. The plural meaning of the bare plural is directly derived from the plural morphology, under the assumption that functional structure is interpreted in terms of the correspondence rules defined in Section 1. The generic reading of English bare plurals is accounted for in this model in Farkas and de Swart (2007). In order to account for the non-definite meaning of bare plurals, we need to adopt a bidirectional view. In the grammar of English, the constraint FDEF is ranked above *Art. This ranking implies marking of determined reference by means of a definite article. Under a strong bidirectional analysis, the definite meaning of English bare nominals is blocked by the definite DP, as illustrated in Figure 1. In this diagram, the two possible forms are at the left-hand side, the two possible meanings at the top. This gives four possible form-meaning pairs, represented by the smaller circles. The arrows represent preferences between the form-meaning pairs, as defined by the constraints. The hands represent the bidirectionally optimal pairs.

Figure 1: Strong bidirectional optimization (English bare plurals)

	non-definite		definite
bare plural	° ✌		°
	↑		↓
definite plural	°	→	° ✌

A definite meaning input (determined reference) requires a definite form to satisfy FDEF (down-arrow in last column). A definite form contributes determined reference because of the correspondence rule (right arrow in bottom row). A non-definite meaning input does not lead to a preference for a definite form, and *Art prefers a bare form, so we find an uparrow in the left column. The bare plural itself does not have a preference for a definite or a non-definite interpretation (no arrow in top row), but given that the definite meaning is associated with another form, it is left with a non-definite interpretation only. Under the strong bidirectional analysis in Figure 1, bare plurals always get a non-definite, plural interpretation.

We can extend this argumentation to bare singulars, in languages where they occur. Class (iii) languages such as Hebrew exemplify a contrast between definite and bare nominals in the singular as well as the plural. In both cases, the bare form gets a non-definite interpretation under strong bidirectional optimization, along the lines scketched in Figure 1.

The range of interpretations of a bare singular in class (i) and (ii) languages is wider than those in class (iii) languages, because there is no competition with a definite form. In the absence of a definite article, bare forms can have both definite and non-definite interpretations according to the grammar. The combination of the OT syntax with the correspondence rules thus captures the data from Mandarin Chinese and Georgian (examples 4 and 5 in Sections 1 and 2 respectively).

3.2 Role of argument structure

There is one wrinkle in the syntax-semantics interface set up so far. Most of the work in dynamic semantics focuses on the role of determiners as the linguistic expression that introduces a discourse referent. Farkas and de Swart (2003) assigned plural morphology a dynamic role, which widened the perspective to include class (v) languages. However, we need to go further to account for the class (i)-(iii) languages. The examples in (3), (4) and (5) above, and discussions in Dayal (1999, 2004, 2007) indicate that bare singular nominals in these languages have full discourse referential power. However, under the sparse syntactic assumptions made in this paper, there is nothing in the functional structure of such nominals that introduces a discourse referent. So how do bare singulars get to function in regular argument position, where they must be able to license discourse referents? We assume the general interpretation rule ARG as a way to connect verbs and different nominal projections in regular argument position.

- ARG: Parse an XP in argument position as a discourse referent (where X = N, Num or D)

ARG relates the presence of some nominal projection (an NP, NumP or DP) in regular argument position to a semantic representation involving a discourse referent. A nominal occurring in a regular argument position instantiates the thematic argument of the predicate by a discourse referent (Farkas and de Swart 2003). Other constructions such as incorporation (Farkas and de Swart 2003) or predication (de Swart, Zwarts and Winter 2007) involve special modes of composition, but these are always morphologically or syntactically 'flagged' as being special. In regular argument position we see the default case of the predicate combining with a discourse referential nominal. The semantic constraint ARG encodes this mode of composition as the unmarked case. All nominals in regular argument position introduce discourse referents according to ARG. Class (i) to (iii) languages just don't reflect the discourse referential status of the nominal argument in the functional projection of the nominal, but use an unmarked (bare) form, as a result of the high ranking of *Art. The interaction of ARG with the

language-specific OT syntax accounts for the observation that bare nominals in class (i) to (iii) languages have full discourse referential status, in line with the claims made by Dayal (1999, 2004, 2007), and others. This completes our account of the syntax-semantics interface in class (i)-(iii) languages.

Notice the following important implication of the appeal to ARG. If an XP is *not* in an argument position, then it does not fall under ARG and, as a consequence, no discourse referent is parsed in that case. In other words, we allow for non-referentiality in non-argument positions. This immediately has consequences for the way noun phrases are expressed in the non-argument positions. As already observed by Longobardi (1994) and others, the usual requirements for referential marking of nominals in type (iv)-(vi) languages often does not hold for nominals in non-argument positions, like predicates or vocatives. (14) and (15) illustrate this for a class (iv) language like St'át'imcets and a class (vi) language like French:

(14) kúkwpi7 kw s-Rose
chief DET nom-Rose
'Rose is a chief.'

(15) Il est médecin
he is doctor
'He is a doctor.'

ARG is not operative in predicative contexts, so no discourse referent is present for these nominals. Therefore the crucial constraint FDR does not apply (cf. de Swart and Zwarts 2008 for an analysis of the special meaning effects arising in these contexts in bidirectional OT). Interestingly, languages differ substantially in how they treat nominals in non-argument positions. English, for instance, does not drop the article of a predicate nominal as easily as many other European languages (de Swart, Winter and Zwarts 2007). There is even more variation in the domain of incorporation (Farkas and de Swart 2003). One interesting but difficult question is how to treat the cross-linguistic variation that we find in such positions, even within the global types that we distinguish in de Swart and Zwarts (2007). This requires a solid characterization of the notion of (non-)argument position and the semantic representation of various non-argument constructions, as well as a view on how finer-grained patterns of variation (with lexical and constructional aspects) can be derived in Optimality Theory.

4 Conclusion

This paper develops a typology of bare nominals, article use and singular/plural morphology in bidirectional Optimality Theory. In this framework, constraints are universal, but they are soft, and can be violated in order to satisfy a more important constraint. The markedness constraints, driving towards minimal functional structure,

and favoring bare nominals conflict with faithfulness constraints driving the expression of cognitive distinctions in atomic/sum reference and discourse referential status. The ranking of constraints is language specific, and the factorial typology produces a range of possible grammars, that are exemplified by various languages. The cross-linguistic variation in the semantics of bare nominals is derived from the typology: certain meanings can be blocked for bare nominals, because they are realized by more specific forms, but this depends on the grammar of the language at hand. In further research, we intend to test the empirical adequacy of the typology against a wider range of languages, and elaborate the set of constraints.

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Substitution Puzzles and Substitutional Semantics

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Abstract

Substitution failure is usually said to occur when a change from one *co-referential* name to another affects the truth value of the sentence. Taking the idea seriously that *non-referring names* like 'Superman' and 'Clark Kent' are indeed *names* and that they do *not refer* (to anything whatsoever), it is argued that the usual characterization does not only give rise to theories which inflate ontology but that it falls short of capturing substitution puzzles about constructions which involve non-referring terms. The paper suggests a more general characterization of substitution failure and proposes an account of (ignorant and enlightened) anti-substitution intuitions which does not invoke referents at all. The account is made formally precise in terms of *associative substitutional semantics*.

1 Introduction

Typically, substitution failure is characterized as follows:

> (SF) Substitution failure occurs when a change from one *co-referential* name to another affects the truth value of the sentence.

Accordingly, in a sentence like (1) a substitution of 'Mark Twain' by 'Samuel Clemens' does not appear to be truth preserving, even though both names are supposed to be co-referential.

> (1) Ann believes that Mark Twain is a writer.
> (1*) Ann believes that Samuel Clemens is a writer.

As first observed in Saul (1997), anti-substitution intuitions are by no means restricted to standard opacity inducing constructions, e.g., to attitude reporting sentences like (1), since they seem to be triggered also in the case of "simple sentences" (i.e., sentences

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which do not contain standard opacity producing expressions like 'believes') such as (2), when the names 'Clark Kent' and 'Superman' are exchanged.

(2) Clark Kent went into the phone booth and Superman came out.
(2*) Superman went into the phone booth and Clark Kent came out.

In agreement with (SF), attempts to explain our intuitions of substitution-resistance typically appeal to the notion of reference. This is the case with Millian (or referentialist) approaches, Fregean approaches, and, as far as I can see, with the rest.[1]

From the intuitive point of view, though, (SF) cannot be sensibly applied to (2) and (2*), as 'Clark Kent' and 'Superman' are *non-referring* terms, and, therefore, just cannot be co-referential. So it seems that reference guided approaches can do justice to our anti-substitution intuitions only at the price of violating our anti-denotation intuitions. What is more, by introducing the referents which are needed for referential theories to take off the ground, reference guided theorists inflate ontology with (more or less perplexing) referents for non-referring terms (i.e., fictional objects or abstract surrogates for them).

Furthermore, the expressions 'Clark Kent' and 'Superman' are intuitively classified as *names*—just like 'Mark Twain' and 'Samuel Clemens'—rather than as (disguised) definite descriptions. Similarly, the first conjunct of (2), e.g., 'Clark Kent went into the phone booth' seems to have the logical form and the truth conditions of an atomic sentence—just like 'Mark Twain went into the phone booth'—rather than those of a complex existential quantification. It seems, thus, that Russell's familiar analysis of sentences in which non-referring terms occur can avoid ontological inflation only by defying intuitions about the logical shape of expressions.[2]

The situation for the reference guided theorist is problematic also with respect to attitude-reporting clauses such as (1) and (1*), even though no non-referring names are contained therein. The problem here is that on a semantical analysis of these sentences in terms of a—philosophically interpreted applied—denotational semantics (e.g., in terms of counterpart theory or in terms of a standard possible worlds semantics for a first-order intensional language) the names 'Mark Twain' and 'Samuel Clemens' do not refer to their actual referent, but to an individual representative of some sort which is contained in the objectual domain of the intended model (e.g., a *possibile*, that is, a

[1] For a recent overview on the positions and the literature on substitution issues see, e.g., Saul (2007) and the references therein. It should be mentioned that reference guided theorists must not be confused with Millians who take it that the sole semantic function of a name is to refer to its bearer. All Millians are reference guided theorists, but the converse does not hold. Fregeans, e.g., are not referentialists, as they think that what is relevant for the truth value of opacity inducing constructions like (1) and (1*) is not the (customary) referent of the names but their sense. However, they are reference guided, since for them (1) and (1*) differ in truth value just because 'Mark Twain' and 'Samuel Clemens' *refer* to different senses within these sentences.

[2] Some theorists take sentences like (2) and (2*) which contain non-referring names to be false (notably, Russell) or, alternatively, to lack a truth value. But it seems that we can safely assume that those who take the transition from (2) to (2*) to be puzzling will not share this view, as they take the puzzle to be triggered by the very fact that the former seems to be true whereas the latter seems false.

possible but non-existing object, or an actualistically acceptable surrogate of the actual referent). In this case our intuitions of denotation are violated again, but now the violation does not consist in the fact that we are forced to foist reference upon non-referring terms, but in that we are invited to take such terms to refer to the surrogates contained in the intended domain of discourse rather than to the intuitively correct referents. (Note that a shift of reference of this kind does not occur when the sentences embedded in (1) and (1*) are considered in isolation.) Again, the referential perspective gives rise to ontological inflation and to various additional problems concerning the newly introduced referents (e.g., to problems with the identity criteria for *possibilia* or with trans-world identity). Of course, the situation for the Fregean is exactly analogous to the situation of the applied denotational semanticist, since for her, as has been noted already, the names in (1) and (1*) refer to the senses of these names rather than to their intuitive referent.

Substitution puzzles which involve non-referring terms strongly suggest that the referential conception of substitution failure is too narrow; (SF) simply fails to capture the puzzle about (2) and (2*). Such cases indicate, I think, that the reference of the exchanged terms does not play any essential role in the formulation of substitution puzzles. By the same token, the truth of identity statements like (2*) seems not to be relevant for the creation of substitution puzzles either, as identity is a relation that obtains between objects (here the referents of the exchanged terms), and there simply are none in this case.

(2*) Clark Kent = Superman.

Moreover, a satisfactory account of anti-substitution intuitions should preferably not give rise to the above mentioned metaphysical problems engendered by referential accounts of intensional constructions such as (1) and (1*).

Now it seems that our anti-substitution intuitions are indeed correct in cases in which we are ignorant about the synonymy of the names exchanged. And, perhaps, they are also correct in cases in which we know that they are synonymous. In this paper I shall suggest a characterization of the notion of substitution failure which does not appeal to the reference of the exchanged terms and outline a semantic account of ignorant and enlightened anti-substitution intuitions from a non-referential perspective on the issues. This explanation will be made formally precise in terms of the framework of what I call *associative substitutional semantics*. The distinctive philosophical feature of this semantics is that it supports a view of the relation between language and the world according to which a sentence can be true without being true about something! The associative framework is, thus, in opposition to the exclusively referential (or denotational) conception of semantics which, in a sense, is dominating since Tarski:

> "We shall understand by *semantics* the totality of considerations concerning those concepts which, roughly speaking, express certain connexions between expressions of a language and the objects and states of affairs *referred* to by

these expressions."[3]

The structure of the remainder of the paper is as follows: Section 2 suggests a non-referential account of substitution failure. In Section 3 the formal framework of associative semantics is presented, and Section 4 addresses a couple of substitution puzzles from a non-referential perspective.

2 A more general conception of substitution failure

On the picture of the relation between language and the world on which the account of the puzzles to be given is based, every referring name has a referent to which it refers and a sense which it expresses, where the sense serves to determine the referent of the name. In contrast to the Fregean conception of sense, we take the sense of a name to be captured by the *nominal definition* of the name. For referring names this definition involves a list of descriptions which contains all the information which may be taken to be captured also by the real definition of its bearer.[4] In case the name does not refer, the nominal definition contains all the information which is associated with that name in the relevant piece of fiction (or discourse). For instance, the nominal definition of the referring name 'Hesperus' will be a list 'the brightest object visible in the evening sky, the brightest object visible in the morning sky, a planet, ...'. Importantly, as on the present account 'Phosphorus' will have the same nominal definition as 'Hesperus', our conception of sense differs crucially from the Fregean.[5]

In addition to the referential portion of the picture, a referring name does also have a *sense-extension* associated with it, which, again, is determined by the nominal definition of the name. Intuitively, the sense-extension of a (referring or non-referring) name contains all the information which is compatible with the nominal definition for that name, whereas the sense-extension of an elementary predicate (independently, of whether it has a referential extension or not) contains all the information associated with that predicate. More precisely, the sense-extension of a name is, in effect, a set of elementary (or pure) atomic sentences which contain that name and which are compatible with its sense. The sense-extension of a predicate, on the other hand, is a consistent set of atomic sentences which contain that predicate. The sense-extension of the name 'Hesperus', e.g., will be {..., Hesperus is a planet, ..., Hammurabi likes Hesperus, ...}. Non-referring names do only have a sense and a sense-extension but no referents. We say that a referring name refers to its bearer and that it *reflects* its sense-extension. A

[3]Tarski (1983), p. 401; my emphasis. (There are several variants of this characterization of semantics in Tarski's writings.)

[4]We take it that the nominal definition of a name is more fundamental than the real definition of the bearer in that we assume that the bearer is defined by a definition of its name. An account of the nominal definitions of numerals and the real definitions of numbers along these lines is suggested in Fine (2002), p. 16.

[5]The nominal definition of 'Hesperus' and 'Phosphorus' will be also that of 'Venus'. I discuss the semantical behaviour of homonyms, like, e.g., 'Venus (planet)' and 'Venus (goddes)' in more detail in Wieckowski (2008).

non-refering name does only reflect. The picture for elementary predicates like '... is a planet' is essentially analogous.[6]

We call the totality of the sense-extensions of the names and the predicates of the language the *level of sense*. The elementary atomic sentences contained in the sense-extensions are not true, they serve to define truth. An elementary atomic sentence is said to be true with respect to the level of sense exactly if the sense-extensions of all the terms which occur in it match with respect to that sentence. The models of the associative substitutional framework (see Section 3) are intended to represent the level of sense of the language.[7] Its *level of reference*, by contrast, can be taken to be represented by the customary denotational first-order models. And the notion of truth with respect to that level can be explained along the familiar lines of denotational first-order semantics. The language which will be discussed in what follows will be a (in the relevant cases intensional) first-order fragment of English.[8] (All this will be made more precise in the next section.)

In view of the narrowness of (SF) and the metaphysical problems with reference guided theories, I suggest that we look to the level of sense in order to explain anti-substitution intuitions. The fact that sense-extensions are sets of sentences will commit us only to an ontology to which we seem to be already committed.[9] And the fact that every name reflects a sense-extension, whereas not every name refers to a referent, will guarantee a greater generality of the reflection-guided account of substitution failure. So we replace (SF) with the following characterization:

> (SFg) Substitution failure occurs when a change from one name to another—both being *substitutionally identical*—affects the truth value of the sentence.

In contrast to the theories which support (SF), this proposal explains the synonymy of names in terms of their substitutional identity rather than (as most reference-guided

[6] We may distinguish, e.g., between the sense-extensions which are objectively associated with the names and predicates (in the same way in which referring names and referential predicates are associated with their referents and referential extensions, respectively), those portions of the objective sense-extensions which a subject associates with these terms, and those which are inter-subjectively associated with them. Unless indicated otherwise, we take sense-extensions to be objective sense-extensions in what follows.

[7] Although we shall assume in what follows that the elements of sense-extensions are sentence types (of a first-order fragment of English), this assumption is not mandatory. Alternatively, granted sufficient syntactic structure, one might take these elements to be, e.g., structured propositions of some language-like system of (neo-Fregean) concepts (see, e.g., Peacocke (1999), pp. 126-127), or, in the case of subjective sense-extensions, formulae of a person's *lingua mentis* (see, e.g., Fodor (1975)).

[8] I discuss the picture outlined above at greater length in Wieckowski (2008). There and in Wieckowski (ms) it is argued that fictional and modal truths are truths with respect to the level of sense rather than truths with respect to the level of reference, and that only sentences which do neither contain non-referring terms, nor intensional operators can be sensibly evaluated with respect to the level of reference.

[9] Of course, when we commit ourselves to something like the alternatives mentioned in footnote 7 this will no longer be so. Note in this connection that we do not introduce (object-language) referents of any sort (i.e., no ficitional referents, no *possibilia*, nor abstract individual representatives and so on). Note also that an ontology of aspects or modes of personification of referents (for discussion see Saul (2007), chapter 2) is not introduced either. This will be seen more clearly in the analyses of Section 4.

approaches have it) their co-reference. We say, e.g., that the statement of substitutional identity ($2^{\dagger}$) is true with respect to the level of sense just in case every elementary atomic sentence B which is just like sentence A except for containing an occurrence of 'Clark Kent' at all or some places where A contains 'Superman' the following holds: A is true with respect to the level of sense just in case B is true with respect to that level.

($2^{\dagger}$) Superman $\ddot{=}$ Clark Kent.

3 A fine-grained substitutional semantics

We shall now provide the picture sketched in the previous section with a formal underpinning.[10]

1. The substitutional language $\mathcal{L}$. Following Kripke (1976), we distinguish the substitutional language proper from its base language. The alphabet of the *base language* $\mathcal{L}_0$ contains nominal substitutional constants $a, b, c, \ldots$ (metavariables: α, β, γ, ...), pure n-ary predicates F^n, G^n, H^n, ... with $n \geq 1$ (metavariables: φ^n, χ^n, ψ^n, ...), and the substitutional identity predicate $\ddot{=}$. (The symbols of the first two categories can appear with subscripts.) We let $\mathcal{C}$ be the set of all nominal constants of $\mathcal{L}_0$ and $\mathcal{P}$ the set of all pure predicates of that language. We do not count $\ddot{=}$ as a pure predicate.

The notion of a sentence of the base language is defined in the usual inductive manner giving us sentences of the form $\varphi^n\alpha_1...\alpha_n$ (pure atomic sentences) and $\alpha_1\ddot{=}\alpha_2$ (where the constants need not be distinct). We let Atm be the set of pure atomic sentences of $\mathcal{L}_0$. Moreover, we define the sets $Atm(\alpha)$ and $Atm(\varphi^n)$ as follows:

$Atm(\alpha) =_{df} \{A \in Atm$: A contains at least one occurrence of the nominal constant $\alpha\}$.

$Atm(\varphi^n) =_{df} \{A \in Atm$: A contains an occurrence of the predicate $\varphi^n\}$.

The *extended language* $\mathcal{L}$ (i.e., the substitutional language proper) extends the alphabet of $\mathcal{L}_0$ with nominal substitutional variables $x, y, z, ...$, the universal substitutional quantifier symbol Π, the logical connectives $\neg$ (negation) and $\wedge$ (conjunction), and with parentheses. We let $\mathcal{V}$ be the denumerable set of nominal variables and we let the set of nominal terms of $\mathcal{L}$ be the union of $\mathcal{C}$ and $\mathcal{V}$. We let $o, o_1, ..., o_n, p, p_1, ..., p_n, ...$ be variables ranging over nominal terms. (Calling the terms "nominal" we deviate from the terminology of "individual" terms, as the semantics will not employ individual domains.)

Atomic formulae of $\mathcal{L}$ have the shape of either $\varphi^n o_1...o_n$ (pure atomic formulae) or $o_1\ddot{=}o_2$ (substitutional identity formulae; the terms need not be distinct). The set of $\mathcal{L}$-formulae (metavariables: $A, B, C, ...$) comprises atomic formulae and formulae of the forms $\neg A$

[10] This section overlaps with the presentations of the associative framework in Wieckowski (2008) and Wieckowski (ms). There I also discuss the differences between this framework and standard substitutional (or truth-value) semantics (cf. Leblanc (1976)).

(negations), $A \wedge B$ (conjunctions), $(\Pi x)A$ (substitutionally quantified universal formulae) and also formulae which are composed from defined connectives $A \vee B$ (disjunctions), $A \rightarrow B$ (conditionals), $A \leftrightarrow B$ (biconditionals), and $(\Sigma x)A$ (substitutionally quantified existential formulae).

2. Semantics. An *associative substitutional model* is a triple $\mathcal{I} = \langle \mathcal{C}, \mathcal{P}, v \rangle$, where $\mathcal{C}$ is a non-empty substitution class of nominal constants of $\mathcal{L}_0$ and $\mathcal{P}$ is the set of pure predicates of $\mathcal{L}_0$. Recall that $\mathcal{P}$ does not contain $\ddot{=}!$ The assignment v is defined as follows: $v : \mathcal{C} \rightarrow \wp(Atm)$ such that $v(\alpha) \subseteq Atm(\alpha)$ and $v : \mathcal{P} \rightarrow \wp(Atm)$ such that $v(\varphi^n) \subseteq Atm(\varphi^n)$. We call the semantic values $v(\alpha)$ and $v(\varphi^n)$ *associates*.

When $\mathcal{I} = \langle \mathcal{C}, \mathcal{P}, v \rangle$ is a model and $\mathcal{V}$ is the set of nominal variables, the assignment to nominal variables σ based on that model is a mapping: $\sigma : \mathcal{V} \rightarrow \mathcal{C}$. Thus for any $x \in \mathcal{V}$, $\sigma(x) = \alpha$ where α is a nominal constant in $\mathcal{C}$ of that model. When σ and τ are two nominal variable assignments, σ and τ are *x-variants* just in case for all nominal variables y except at most x, $\tau(y) = \sigma(y)$.

Let $\mathcal{I} = \langle \mathcal{C}, \mathcal{P}, v \rangle$ be a model and σ an assignment in $\mathcal{C}$. Then for any nominal term o the *term value* of o with respect to v and σ, $v_\sigma(o)$, is defined as follows:

$$v_\sigma(o) = \begin{cases} v(o) & \text{if } o \text{ is a nominal constant} \\ v(\sigma(o)) & \text{if } o \text{ is a nominal variable.} \end{cases}$$

We now define truth in a model $\mathcal{I} = \langle \mathcal{C}, \mathcal{P}, v \rangle$ with respect to some nominal variable assignment σ as follows:

1. $\mathcal{I}_\sigma \models \varphi^n o_1 ... o_n$ iff (i) if $o_1, ..., o_n$ are nominal constants, then $o_1, ..., o_n \in \mathcal{C}$ and if they are nominal variables, then $\sigma(o_1), ..., \sigma(o_n) \in \mathcal{C}$ and (ii) $\varphi^n o_1 ... o_n \in v_\sigma(o_1) \cap ... \cap v_\sigma(o_n) \cap v(\varphi^n)$; otherwise $\mathcal{I}_\sigma \not\models \varphi^n o_1 ... o_n$.
2. $\mathcal{I}_\sigma \models o_1 \ddot{=} o_2$ iff for all pure atomic formulae B_1 and B_2 where B_2 is like B_1 except for containing occurrences of the term o_2 at one or all places where B_1 contains the term o_1: $\mathcal{I}_\sigma \models B_1$ iff $\mathcal{I}_\sigma \models B_2$.
3. $\mathcal{I}_\sigma \models \neg A$ iff $\mathcal{I}_\sigma \not\models A$.
4. $\mathcal{I}_\sigma \models A \wedge B$ iff $\mathcal{I}_\sigma \models A$ and $\mathcal{I}_\sigma \models B$.
5. $\mathcal{I}_\sigma \models (\Pi x)A$ iff for every x-variant τ of σ: $\mathcal{I}_\tau \models A$.[11]

The clauses for disjunctions, conditionals, biconditionals, and substitutionally quantified existential formulae are given in the obvious way. For example, the clause for the latter is: $\mathcal{I}_\sigma \models (\Sigma x)A$ iff for some x-variant τ of σ: $\mathcal{I}_\tau \models A$.

A sentence A of $\mathcal{L}$ is *true in* a model $\mathcal{I} = \langle \mathcal{C}, \mathcal{P}, v \rangle$ (in symbols: $\mathcal{I} \models A$) iff it is true in that model under all assignments to the nominal variables.

[11] Associative truth clauses exclusively for sentences of $\mathcal{L}$ are offered in Wieckowski (ms). There the clauses for substitutional quantifications take a form which is familiar from truth-value semantics.

3. Admissible associative models. Admissible associative models represent the level of sense and the above truth conditions are intended to capture the notion of truth with respect to that level. Associative models are admissible just in case they satisfy certain constraints imposed upon the valuation function v. Intuitively, these constraints are governed by nominal definitions for the constants in the substitution class $\mathcal{C}$ and by meaning postulates for the predicates in $\mathcal{P}$.

To explain the notion of an admissible model we introduce a couple of auxiliary notions by making the following stipulations:

> (A1) Every nominal constant $\alpha \in \mathcal{C}$ has a (possibly empty) *defining associate*, $v_{def}(\alpha)$, associated with it. This is the set of all sentences from $Atm(\alpha)$ which we call *defining of* α. (This associate captures the nominal definition of the name symbolized by α.)
>
> (A2) For every nominal constant $\alpha \in \mathcal{C}$ which has a defining associate, $Def(\alpha) \subseteq \mathcal{P}$ is the set of all the pure predicates occurring in the sentences in $v_{def}(\alpha)$. If $Def(\alpha) = \{\varphi, \chi, \psi, ...\}$, we say that $\varphi, \chi, \psi, ...$ are the *defining predicates* of α.
>
> (A3) Every pure predicate φ in $\mathcal{P}$ has a *meaning postulate*, $Mp(\varphi)$, associated with it. $Mp(\varphi)$ is a sentence of $\mathcal{L}$. We put $Mp =_{def} \{Mp(\varphi) : \varphi \in \mathcal{P}\}$. A meaning postulate for φ determines which predicates are consequential upon φ with respect to some nominal constant, and which predicates conform to φ with respect to it: (a) A predicate $\chi \in \mathcal{P}$ is *(definitionally) consequential upon* φ with respect to a constant $\alpha \in \mathcal{C}$ just in case, if $\varphi...\alpha... \in v_{def}(\alpha)$, then $\chi...\alpha...$ is Mp-derivable from $v_{def}(\alpha)$; (b) A predicate $\chi \in \mathcal{P}$ *(definitionally) conforms to* φ with respect to α just in case, if $\varphi...\alpha... \in v_{def}(\alpha)$, then $\chi...\alpha...$ is Mp-consistent with $v_{def}(\alpha)$.

(We assume that the relavant notion of derivability and consistency is that of a purely syntactical meaning calculus (of meaning rules) which captures the postulates in Mp. The sole syntactical function of that calculus is to fill the associates with pure atomic sentences in a systematic way.)

Let $\mathcal{I} = \langle \mathcal{C}, \mathcal{P}, v \rangle$ be a model and α any nominal constant in $\mathcal{C}$. An *assignment to a constant* α is said to be *admissible* just in case it satisfies the following conditions:

> (B1) The resulting associate $v(\alpha)$ for α contains the *defining associate* of α, i.e., $v_{def}(\alpha)$.
>
> (B2) The resulting associate $v(\alpha)$ for α contains the *consequential associate* of α, $v_{cns}(\alpha)$, i.e., the set of all sentences from $Atm(\alpha)$ which are derivable from $v_{def}(\alpha)$ in view of Mp.

We call the set $v_{chr}(\alpha) = v_{def}(\alpha) \cup v_{cns}(\alpha)$ the *characteristic associate* of α. (So an assignment to a constant α is admissible just in case $v_{chr}(\alpha) \subseteq v(\alpha)$.) We call the set $Chr(\alpha)$ of predicates which occur in the elements of $v_{chr}(\alpha)$ the set of *characteristic predicates* for α.

When $\mathcal{I} = \langle \mathcal{C}, \mathcal{P}, v \rangle$ is a model and α any constant in $\mathcal{C}$, we say that an *assignment to a predicate* $\varphi \in \mathcal{P}$ is *admissible* just in case the resulting predicate associate $v(\varphi)$ for φ contains all the sentences from $Atm(\varphi)$ that are contained in the characteristic associates $v_{chr}(\alpha)$ for any $\alpha \in \mathcal{C}$.

We call a model $\mathcal{I} = \langle \mathcal{C}, \mathcal{P}, v \rangle$ *admissible* just in case it satisfies the conditions on admissible assignments to nominal constants and pure predicates just stated.

When $\mathcal{I} = \langle \mathcal{C}, \mathcal{P}, v \rangle$ is a model and α a constant in $\mathcal{C}$, we define the *(characteristically) conforming associate* of α, $v_{cnf_{chr}}(\alpha) \subseteq v(\alpha)$ to be the set of sentences form $Atm(\alpha)$ which are derivationally consistent with $v_{chr}(\alpha)$ given Mp. We call the predicates which occur in the sentences from $v_{cnf_{chr}}(\alpha)$ and which are not already contained in $Chr(\alpha)$ the *(characteristically) conforming predicates* of α. These predicates form the set $Cnf_{chr}(\alpha)$.

There is a subclass of admissible models in which atomic formulae can come out true which are composed from conforming predicates. These models will be the intended ones considered in later sections. We call an admissible model $\mathcal{I} = \langle \mathcal{C}, \mathcal{P}, v \rangle$ *diversifying* when and only when it satisfies the conditions that for some $\alpha \in \mathcal{C}$ and some $\varphi^n \in \mathcal{P}$: (a) $v_{chr}(\alpha)$ is such that $v_{chr}(\alpha) \subseteq v(\alpha)$ and $v_{chr}(\alpha) \neq v(\alpha)$; and (b) $v(\varphi^n)$ is such that $\varphi^n \notin \mathcal{C}hr(\alpha)$.

For any admissible model $\mathcal{I} = \langle \mathcal{C}, \mathcal{P}, v \rangle$, we require that the set of the associates for all the pure predicates in $\mathcal{P}$, which we call the *spectrum of predicates* of the model, be Mp-consistent. In contrast, the associate of a nominal constant α in an admissible model, $v(\alpha) = v_{chr}(\alpha) \cup v_{cnf_{chr}}(\alpha)$, will not be a consistent set in view of Mp. The reason is that the members of $v_{cnf_{chr}}(\alpha)$ are only required to be consistent with the characteristic associate and need not be consistent with each other. We call the union of the associates for all nominal constants of an admissible model the *spectrum of constants*.

An example: {Hesperus is a planet} is a subset of the characteristic portion of the actual sense-extension of 'Hesperus', and {Hammurabi likes Hesperus, Hesperus is smaller than Jupiter, Jupiter is smaller than Hesperus} is a subset of the characteristically conforming sense-extension of this name. The actual sense-extension of the predicate '... is smaller than ...' contains {Hesperus is smaller than Jupiter} as a subset but not {Jupiter is smaller than Hesperus}.

4 Addressing the puzzles at the level of sense

We say that an agent is *enlightened* with respect to the synonymy of a pair of names, when she is in a position to assent to a statement of substitutional identity which is composed from these names, and that she is *ignorant* otherwise. In what follows we shall first consider puzzle cases, in which we are ignorant about the synonymy of a pair of names, as they seem to be less problematic than those in which we are enlightened.

4.1 Ignorant anti-substitution intuitions

With the exception of (1) and (7) every example we shall consider in what follows is taken from Saul (2007).

1. Phone booth. Consider the following triad:

> (2) *C*lark Kent went *i*nto the phone booth and *S*uperman came *o*ut. (In symbols: $Ic \wedge Os$.)
>
> (2*) *S*uperman went *i*nto the phone booth and *C*lark Kent came *o*ut. ($Is \wedge Oc$.)
>
> ($2^{\dagger}$) *S*uperman $\ddot{=}$ *C*lark Kent. ($s \ddot{=} c$.)

In the ignorant case we take (2) to be true and (2*) to be false, because we do not know that ($2^{\dagger}$) is true.

We can model such cases in terms of *restricted associative models*. These models represent the portion of the level of sense which is accessible to an ignorant agent $\mathtt{a}$. To obtain a restricted model, $\mathcal{I}_{\mathtt{a}} = \langle \mathcal{C}, \mathcal{P}, v_{\mathtt{a}} \rangle$, from an unrestricted one, $\mathcal{I} = \langle \mathcal{C}, \mathcal{P}, v \rangle$, we relativize the valuation v to $\mathtt{a}$. (Like remarks apply to the portion $v_{\mathtt{a}}(\varphi^n)$ of the sense-extension of a predicate φ^n that is accessible to the agent.)

A simple (fragment of a) restricted model in which the sentences from the phone booth triad receive their correct ignorant truth values is the following one:

> $\mathcal{I}_{\mathtt{a}} = \langle \mathcal{C}, \mathcal{P}, v_{\mathtt{a}} \rangle$ where: $\mathcal{C} = \{c, s\}$; $\mathcal{P} = \{I, O\}$; $v_{\mathtt{a}}(c) = \{Ic\}$; $v_{\mathtt{a}}(s) = \{Os\}$; $v_{\mathtt{a}}(I) = \{Ic\}$; $v_{\mathtt{a}}(O) = \{Os\}$.

In this model we have: $\mathcal{I}_{\mathtt{a}} \models Ic \wedge Os$; $\mathcal{I}_{\mathtt{a}} \not\models Is \wedge Oc$; $\mathcal{I}_{\mathtt{a}} \not\models Ic \wedge Oc$; $\mathcal{I}_{\mathtt{a}} \not\models Is \wedge Os$. We also have: $\mathcal{I}_{\mathtt{a}} \not\models s \ddot{=} c$. In the unrestricted model $\mathcal{I} = \langle \mathcal{C}, \mathcal{P}, v \rangle$ which represents the objective level of sense and in the enlightened models all these sentences will come out true. Here, the (relevant fragment of the) enlightened model will be:

> $\mathcal{I}_{\mathtt{a}} = \langle \mathcal{C}, \mathcal{P}, v_{\mathtt{a}} \rangle$ where: $\mathcal{C} = \{c, s\}$; $\mathcal{P} = \{I, O\}$; $v_{\mathtt{a}}(c) = \{Ic, Oc\}$; $v_{\mathtt{a}}(s) = \{Os, Is\}$; $v_{\mathtt{a}}(I) = \{Ic, Oc\}$; $v_{\mathtt{a}}(O) = \{Os, Is\}$.

2. Building leaping. As we do not know that ($2^{\dagger}$) is true, we take (3) to be true and (3*) to be false.

(3) *S*uperman *l*eaps more tall buildings than *C*lark Kent. (Lsc.)

(3*) *C*lark Kent *l*eaps more tall buildings than *S*uperman. (Lcs.)

This situation can be modeled as follows:

$\mathcal{I}_{\mathtt{a}} = \langle \mathcal{C}, \mathcal{P}, v_{\mathtt{a}} \rangle$ where: $\mathcal{C} = \{s, c\}$; $\mathcal{P} = \{L\}$; $v_{\mathtt{a}}(s) = \{Lsc\}$; $v_{\mathtt{a}}(c) = \{Lsc\}$; $v_{\mathtt{a}}(L) = \{Lsc\}$.

We have: $\mathcal{I}_{\mathtt{a}} \models Lsc$; $\mathcal{I}_{\mathtt{a}} \not\models Lcs$; $\mathcal{I}_{\mathtt{a}} \not\models Lss$; $\mathcal{I}_{\mathtt{a}} \not\models Lcc$. We also obtain: $\mathcal{I}_{\mathtt{a}} \not\models s \ddot{=} c$. In the unrestricted model and in the enlightened models the $\ddot{=}$-sentence will be true, but the above leaping sentences will be false. In this case, a simple fragment of the enlightened model will be:

$\mathcal{I}_{\mathtt{a}} = \langle \mathcal{C}, \mathcal{P}, v_{\mathtt{a}} \rangle$ where: $\mathcal{C} = \{s, c\}$; $\mathcal{P} = \{L, K, T\}$; $v_{\mathtt{a}}(s) = \{Lsc, Lcs, Ks, Tsc, Tcs, Tss\}$; $v_{\mathtt{a}}(c) = \{Lsc, Lcs, Kc, Tsc, Tcs, Tcc\}$; $v_{\mathtt{a}}(L) = \{\ \}$; $v_{\mathtt{a}}(K) = \{Ks, Kc\}$; $v_{\mathtt{a}}(T) = \{Tsc, Tcs, Tss, Tcc\}$.

Here we may take K to symbolize '... is a Kryptonian' and T to symbolize '... is as tall as ...'.

3. Love life. As a last example of a simple sentence with names we shall consider the case in which we do not know that ($2^{\dagger}$) is true, and assume (4) to be true and (4*) to be false.

(4) *L*ois *s*lept with *S*uperman but she didn't *s*leep with *C*lark Kent. ($Sls \wedge \neg Slc$.)

(4*) *L*ois *s*lept with *C*lark Kent but she didn't *s*leep with *S*uperman. ($Slc \wedge \neg Sls$.)

A restricted model of this situation will be:

$\mathcal{I}_{\mathtt{a}} = \langle \mathcal{C}, \mathcal{P}, v_{\mathtt{a}} \rangle$ where: $\mathcal{C} = \{l, s, c\}$; $\mathcal{P} = \{S\}$; $v_{\mathtt{a}}(l) = \{Sls\}$; $v_{\mathtt{a}}(s) = \{Sls\}$; $v_{\mathtt{a}}(c) = \{\ \}$; $v_{\mathtt{a}}(S) = \{Sls\}$.

We have: $\mathcal{I}_{\mathtt{a}} \models Sls \wedge \neg Slc$; $\mathcal{I}_{\mathtt{a}} \not\models Slc \wedge \neg Sls$; $\mathcal{I}_{\mathtt{a}} \not\models Sls \wedge \neg Sls$; $\mathcal{I}_{\mathtt{a}} \not\models Slc \wedge \neg Slc$. And we have: $\mathcal{I}_{\mathtt{a}} \not\models s \ddot{=} c$. In unrestricted model and in the enlightened ones the $\ddot{=}$-sentence will be true, but the rest of the sentences considered will come out false. We shall now consider a couple of non-name cases discussed in Saul (2007).

4. Definite descriptions. We take names and definite descriptions to be singular terms rather than devices of quantification and formalize them, accordingly, as nominal constants rather than, like on the familiar Russellian analysis, as complex existential quantifications. (There is no metaphysical motivation for such an analysis, when we look to the level of sense.) We treat definite descriptions semantically in the same way like names. Thus the nominal constants which symbolize them, can be contained in substitution classes, can be assigned associates and so on.

The sense-extensions of definite descriptions (and, accordingly, the associates of the nominal constants which represent them) differ from names in but one respect: The defining portion of the sense-extension of a definite description contains a *single* pure atomic sentence. Consider, e.g., the description 'the worst-dressed superhero' (in symbols: h). The defining portion of the sense-extension of this description is {The worst-dressed superhero is the worst-dressed superhero}. As sense-extensions do only contain pure atomic sentences, the 'is' in the sentence contained in it is a copula rather than an identity predicate. Accordingly, we take this sentence to be composed from the singular term 'the worst-dressed superhero' and the 1-place predicate '... is the worst-dressed superhero' and take its formalization to receive the logical form of a pure atomic sentence of $\mathcal{L}$, i.e., $\varphi\alpha$.[12] The meaning postulate for '... is the worst-dressed superhero' will be to the effect that it implies, e.g., the predicates '... is worst-dressed' and '... is a superhero'.

Let us assume that according to the fiction, Superman is the worst-dressed superhero and Clark Kent is the shyest reporter. Our ignorance about the truth of ($2^{\dagger}$) allows us to assume that (5) is true and (5*) false.

> (5) The shyest *r*eporter went *i*nto the phone booth and the worst-dressed super*h*ero came *o*ut. ($Ir \wedge Oh$.)
>
> (5*) The worst-dressed super*h*ero went *i*nto the phone booth and the shyest *r*eporter came *o*ut. ($Ih \wedge Or$.)

An ignorant model which captures this situation is the following one:

> $\mathcal{I}_{\mathtt{a}} = \langle \mathcal{C}, \mathcal{P}, v_{\mathtt{a}} \rangle$ where: $\mathcal{C} = \{r, h\}$; $\mathcal{P} = \{R, H, I, O\}$; $v_{\mathtt{a}}(r) = \{Rr, Ir\}$; $v_{\mathtt{a}}(h) = \{Hh, Oh\}$; $v_{\mathtt{a}}(R) = \{Rr\}$; $v_{\mathtt{a}}(H) = \{Hh\}$; $v_{\mathtt{a}}(I) = \{Ir\}$; $v_{\mathtt{a}}(O) = \{Oh\}$.

We have: $\mathcal{I}_{\mathtt{a}} \models Ir \wedge Oh$; $\mathcal{I}_{\mathtt{a}} \not\models Ih \wedge Or$; $\mathcal{I}_{\mathtt{a}} \not\models Ir \wedge Or$; $\mathcal{I}_{\mathtt{a}} \not\models Ih \wedge Oh$. And we also obtain: $\mathcal{I}_{\mathtt{a}} \models Rr$; $\mathcal{I}_{\mathtt{a}} \models Hh$; $\mathcal{I}_{\mathtt{a}} \models r \ddot{=} r$; $\mathcal{I}_{\mathtt{a}} \models h \ddot{=} h$; $\mathcal{I}_{\mathtt{a}} \not\models h \ddot{=} r$. In the unrestricted model and in the enlightened models all sentences considered will be true.[13]

5. Indexicals. We assume (oversimplifying greatly) that, at the level of sense, indexicals recieve an anaphoric treatment. The idea is, roughly, to substitute the indexical expressions in the original sentence by the singular terms to which they are anaphorically

[12] There is room for such a construal of 'The worst-dressed superhero is the worst-dressed superhero', as there is a perfectly good sense in which Lois Lane might suffer from the fact that the worst-dressed superhero is the worst-dressed superhero, without suffering from the fact that he is self-identical.

[13] A terminological remark: It seems to me to be philosophically misleading to call non-referring expressions like 'the worst-dressed superhero' "definite descriptions" as this suggests that there is a bearer this expression describes as possessing such-and-such identifying traits. Of course, this terminology is inappropriate for the level of sense in general, since we do not describe anything when we reflect the sense-extensions of singular terms and predicates. Nevertheless, we shall stick to the usual terminological convention. Note in this connection that it would be odd to assume that a non-referring definite description like 'the worst-dressed superhero' describes something after all, e.g., an intentional object. For, arguably, abstract objects (like these) do not wear cloth and so on. (This does also apply when non-referring names or referring names which occur in intensional contexts are taken to refer to abstract objects.)

linked and then to evaluate the resulting substitution instance instead of the original indexical sentence. Let us assume, for example, that according to the fiction, Lois Lane sees Superman flying through the sky and utters (7).

(7) I adore him.

In this case 'I' will be linked to 'Lois Lane' and 'him' to 'Superman', and (7) will be evaluated in terms of (7′).

(7′) Lois Lane adores Superman.

Next consider sentence (8).

(8) He hit Lex Luther more times than he did.

We assume that the fiction links the first occurrence of 'he' to 'the be-caped hero in the Superhero Book of Mug Shots', and the second to 'the shy reporter lurking in the corner of the room'. We then evaluate (8) as (8′).

(8′) The be-caped hero in the Superhero Book of Mug Shots hit Lex Luther more times than the shy reporter lurking in the corner of the room did.

In the appropriate restricted model (8) will be true, but it will be false in the unrestricted model and in the enlightened ones. (The situation here is similar to that of (3).)

6. Quantification. Let us consider a further example presented in Saul (2007). According to the fiction, Clark Kent's shy colleagues *A*rt and *B*art are sitting together with *C*lark in the conference room. All of them bemoan their lack of dates for an upcoming ball. Sentence (9), thus, seems to be true of this scenario.

(9) Nobody *i*n the conference roo*m* is *s*uccessful with woman.

In the appropriate ignorant model $\neg(\Sigma x)(Ixm \wedge Sx)$ will be true. But it will be false in the unrestricted model and the enlightened ones, as in view of the relevant piece of fiction they will ensure the truth of something like '*S*uperman is a *h*eart-throb' and of 'Superman $\ddot{=}$ Clark Kent'. Here the meaning postulate for '... is a *h*eart-throb' will ensure that '... is *s*uccessful with woman' is implied.

An ignorant model which captures this situation is the following one:

$\mathcal{I}_{\mathtt{a}} = \langle \mathcal{C}, \mathcal{P}, v_{\mathtt{a}} \rangle$ where: $\mathcal{C} = \{a, b, c, s, m\}$; $\mathcal{P} = \{I, S, H\}$; $v_{\mathtt{a}}(a) = \{Iam, Sa\}$; $v_{\mathtt{a}}(b) = \{Ibm, Sb\}$; $v_{\mathtt{a}}(c) = \{Icm, Sc\}$; $v_{\mathtt{a}}(s) = \{Hs, Ss\}$; $v_{\mathtt{a}}(m) = \{Iam, Ibm, Icm\}$; $v_{\mathtt{a}}(I) = \{Iam, Ibm, Icm\}$; $v_{\mathtt{a}}(S) = \{Ss\}$; $v_{\mathtt{a}}(H) = \{Hs\}$.

An enlightened model will be as follows:

$\mathcal{I}_{\mathtt{a}} = \langle \mathcal{C}, \mathcal{P}, v_{\mathtt{a}} \rangle$ where: $\mathcal{C} = \{a, b, c, s, m\}$; $\mathcal{P} = \{I, S, H\}$; $v_{\mathtt{a}}(a) = \{Iam, Sa\}$; $v_{\mathtt{a}}(b) = \{Ibm, Sb\}$; $v_{\mathtt{a}}(c) = \{Icm, Sc, Hc\}$; $v_{\mathtt{a}}(s) = \{Ism, Ss, Hs\}$; $v_{\mathtt{a}}(m) = \{Iam, Ibm, Icm, Ism\}$; $v_{\mathtt{a}}(I) = \{Iam, Ibm, Icm, Ism\}$; $v_{\mathtt{a}}(S) = \{Sc, Ss\}$; $v_{\mathtt{a}}(H) = \{Hc, Hs\}$.

7. Attitude Reports. Let us now consider a case in which our reluctance to substitute is triggered by the opacity inducing attitude verb 'believes'.

(1) Ann believes that *M*ark Twain is a *w*riter. ($\mathrm{B}_a(Wm)$.)

(1*) Ann believes that Sam*u*el Clemens is a *w*riter. ($\mathrm{B}_a(Wu)$.)

To explain this case we extend our substitutional language $\mathcal{L}$ with an operator for belief, B_a (informally: 'a believes that'), and employ doxastic associative models. Doxastic models represent the portion of the level of sense which is doxastically accessible to a subject a.

A doxastic model is a 6-tuple $\mathcal{D} = \langle S, R, \mathcal{C}, c, \mathcal{P}, v\rangle$ where: S is a non-empty set of indices $s, t, ...$ (intuitively, doxastic states); $R \subseteq S \times S$; $\mathcal{C}$ and $\mathcal{P}$ are as before; $c : S \to \wp(\mathcal{C})$ with $c(s)$ being the substitution class for some $s \in S$ and $\mathcal{C} = \bigcup_{s\in S} c(s)$; finally, v is defined as follows: $v : \mathcal{C} \times S \to \wp(Atm)$ such that $v(\alpha, s) \subseteq Atm(\alpha)$ and $v : \mathcal{P} \times S \to \wp(Atm)$ such that $v(\varphi^n, s) \subseteq Atm(\varphi^n)$. Assignments σ to the nominal variables are relativized to the elements of S in the natural way. The clause for the belief operator is: $\mathcal{D}_\sigma \models_s \mathrm{B}_a(A)$ iff for all $t \in S$, if sRt then $\mathcal{D}_\sigma \models_t A$. The other clauses remain, *mutatis mutandis*, as before.

To model the doxastic state of an ignorant doxastic subject we put $a = \mathtt{a}$ and relativize the valuation to the ignorant agent $\mathtt{a}$ letting $v_\mathtt{a}$ be defined as follows: $v_\mathtt{a} : \mathcal{C} \times S \to \wp(Atm)$ such that $v_\mathtt{a}(\alpha, s) \subseteq Atm(\alpha)$ and $v_\mathtt{a} : \mathcal{P} \times S \to \wp(Atm)$ such that $v_\mathtt{a}(\varphi^n, s) \subseteq Atm(\varphi^n)$. Restricted doxastic models represent the portion of the level of sense which is doxastically accessible to an ignorant doxastic subject $\mathtt{a}$. The following restricted model is one of those which capture the situation $\mathtt{a}$ faces with respect to the pair (1) and (1*):

> $\mathcal{D}_\mathtt{a} = \langle S, R, \mathcal{C}, c, \mathcal{P}, v_\mathtt{a}\rangle$, where: $S = \{s, t\}$; $R = \{\langle s, t\rangle, \langle s, s\rangle, \langle t, t\rangle\}$; $\mathcal{C} = c(s) = c(t) = \{m, u\}$; and $\mathcal{P} = \{W\}$. The assignments to the nominal constants and predicate letters is as follows.
>
> For 'Mark' (m): $v_\mathtt{a}(m, s) = v_\mathtt{a}(m, t) = \{Wm\}$.
>
> For 'Samuel' (u): $v_\mathtt{a}(u, s) = \{\ \}$; $v_\mathtt{a}(u, t) = \{Wu\}$.
>
> For 'writer' (W): $v_\mathtt{a}(W, s) = \{Wm\}$; $v_\mathtt{a}(W, t) = \{Wm, Wu\}$.

We obtain: $\mathcal{D}_\mathtt{a} \models_s \mathrm{B}_\mathtt{a}(Wm)$; $\mathcal{D}_\mathtt{a} \not\models_s \mathrm{B}_\mathtt{a}(Wu)$; and $\mathcal{D}_\mathtt{a} \not\models_s m{\ddot{=}}u$. (In the above model $\mathtt{a}$ associates Wu with W but does not associate it with u.) In enlightened doxastic models $\mathrm{B}_a(Wm)$, $\mathrm{B}_a(Wu)$, and $m{\ddot{=}}u$ will be true at s.

8. Name Change. As a last example we shall consider the case of a simple sentence, in which we use synonymous names in a conventionally restricted way rather than being ignorant about their synonymy. Consider the following situation. There was a phase of time a certain city was called 'Leningrad' and a time before and after that phase it was called 'St Petersburg'. On the assumption that Albert visited this city in the strech of

time it was called 'St Petersburg', it seems that (9) is true, whereas (9*) seems to be false.[14]

(9) *A*lbert never *v*isited *L*eningrad, but he *v*isited St *P*etersburg.
(In symbols: $\neg \mathrm{P}(Val) \wedge \mathrm{P}(Vap)$.)

(9*) *A*lbert never *v*isited St *P*etersburg, but he *v*isited *L*eningrad.
(In symbols: $\neg \mathrm{P}(Vap) \wedge \mathrm{P}(Val)$.)

To explain anti-substitution intuitions in this case, we extend our substitutional language with an operator P for 'It was the case that' and consider conventionally restricted temporal models. Such a model is a 7-tuple $\mathcal{T}_{\mathsf{c}} = \langle T, <, t_0, \mathcal{C}, c, \mathcal{P}, v_{\mathsf{c}} \rangle$ restricted by some convention c where: T is a non-empty set of indices $t, t', t'', ...$ (intuitively, instants of time); $<$ is a binary relation on T; t_0 is "now"; $\mathcal{C}$ and $\mathcal{P}$ are as usual; $c : T \rightarrow \wp(\mathcal{C})$ with $c(t)$ being the substitution class for some $t \in T$ and $\mathcal{C} = \bigcup_{t \in T} c(t)$; and $v_{\mathsf{c}} : \mathcal{C} \times T \rightarrow \wp(Atm)$ such that $v_{\mathsf{c}}(\alpha, t) \subseteq Atm(\alpha)$ and $v_{\mathsf{c}} : \mathcal{P} \times T \rightarrow \wp(Atm)$ such that $v_{\mathsf{c}}(\varphi^n, t) \subseteq Atm(\varphi^n)$. For simplicity we let the substitution classes be constant across instants of time (i.e., for any $t \in T$, $c(t) = \mathcal{C}$). The clause for the P-operator takes the familiar shape: $\mathcal{T}_{\mathsf{c}\sigma} \models_{t_0} \mathrm{P}(A)$ iff for some $t \in T$, $t < t_0$ and $\mathcal{T}_{\mathsf{c}\sigma} \models_t A$. The clauses for negation and conjunction are also as usual.

A conventionally restricted model which captures anti-substitution intuitions concerning the pair (9) and (9*) is the following one:

$\mathcal{T}_{\mathsf{c}} = \langle T, <, t_0, \mathcal{C}, c, \mathcal{P}, v_{\mathsf{c}} \rangle$, where: $T = \{t_1, t_2, t_3, t_4, t_5, t_6, t_7\}$; $t_0 = t_7$; $<$ (intuitively, the earlier-later relation) is a linear order on T (i.e., $<$ is irreflexive, transitive, and weakly connected; we shall assume that the structure of time is isomorphic to real numbers); $\mathcal{C} = \{a, p, l\}$, where $c(t) = \mathcal{C}$ for all $t \in T$; and $\mathcal{P} = \{V\}$.

The convention c for the restriction of the valuation of 'St Petersburg' (symbol: p), 'Leningrad' (symbol: l), and 'visits' (symbol: V) is as follows:

1. We let $\{t_1, t_2, t_5, t_6, t_7\}$ be the phase of time in which Leningrad/St Petersburg sentences are to be evaluated in terms of atomic sentences which contain the name 'St Petersburg' rather than 'Leningrad' (= *p-phase*).

2. We let $\{t_3, t_4\}$ be the phase of time in which Leningrad/ St Petersburg sentences are to be evaluated in terms of atomic sentences which contain the name 'Leningrad' rather than 'St Petersburg' (= *l-phase*).

In accordance with convention c we shall consider restricted valuations which satisfy the following conditions:

[14]This is a variant of an example originally proposed in Saul (1997). For an elaborate reference guided account of anti-substitution intuitions in the case of name change (which proceeds in terms of a Montagovian framework) see Zimmermann (2005).

(a) The conventionally restricted associates of the nominal constant a which represent the sense-extensions of 'Albert' contain in their conforming portions Vap at $t_{1,2,5,6,7} \in T$ (i.e., in the p-phase) but Val at $t_{3,4} \in T$ (i.e., in the l-phase).

(b) The conventionally restricted associates of the predicate letter V which represent the sense-extensions of the predicate 'visits' are arranged in such a way that (i) no pure atomic sentence which is composed from V and l is in the sense-extension of V in the p-phase, and (ii) no pure atomic sentence which is composed from V and p is in the sense-extension of V in the l-phase.

Moreover, the actual sense-extension of V will not contain Val in the l-phase but it will contain Vap in the p-phase. The following valuation satisfies convention c:

For 'Albert' (a):
$v_{\mathsf{c}}(a, t_{1,2,5,6,7}) = \{Vap\}$; $v_{\mathsf{c}}(a, t_{3,4}) = \{Val\}$.

For 'St Petersburg' (p):
$v_{\mathsf{c}}(p, t_{1,2,5,6}) = \{Vap\}$; $v_{\mathsf{c}}(p, t_{3,4}) = v_{\mathsf{c}}(p, t_7) = \{\ \}$.

For 'Leningrad' (l):
$v_{\mathsf{c}}(l, t_{1,2,5,6}) = v_{\mathsf{c}}(l, t_7) = \{\ \}$; $v_{\mathsf{c}}(l, t_{3,4}) = \{Val\}$.

For 'visits' (V):
$v_{\mathsf{c}}(V, t_{1,2,5,6}) = \{Vap\}$; $v_{\mathsf{c}}(V, t_{3,4}) = v_{\mathsf{c}}(V, t_7) = \{\ \}$.

We have: $\mathcal{T}_{\mathsf{c}} \models_{t_{1,2,5,6}} Vap$; $\mathcal{T}_{\mathsf{c}} \not\models_{t_{3,4,7}} Vap$; $\mathcal{T}_{\mathsf{c}} \not\models_{t_{1,2,3,4,5,6,7}} Val$; $\mathcal{T}_{\mathsf{c}} \models_{t_7} \neg\mathrm{P}(Val) \wedge \mathrm{P}(Vap)$; $\mathcal{T}_{\mathsf{c}} \not\models_{t_7} \neg\mathrm{P}(Vap) \wedge \mathrm{P}(Val)$; and $\mathcal{T}_{\mathsf{c}} \not\models_{t_{1,2,3,4,5,6,7}} p \ddot{=} l$.

In the unrestricted model $\mathcal{T} = \langle T, <, t_0, \mathcal{C}, c, \mathcal{P}, v\rangle$ convention c does not hold. The (conforming portions of the) associates of a, p, and l will contain $\{Vap, Val\}$ as a subset. And the actual associates of V will contain both Vap and Val. In the unrestricted model both $\neg\mathrm{P}(Val) \wedge \mathrm{P}(Vap)$ and $\neg\mathrm{P}(Vap) \wedge \mathrm{P}(Val)$ will be false, whereas $p \ddot{=} l$ will be true. Thus in conventionally restricted models the names 'St Petersburg' and 'Leningrad' are not synonymous with respect to the level of sense, whereas in the unrestricted model one cannot discern phases.

4.2 Enlightened anti-substitution intuitions

Many reference guided theorists have enlightened anti-substitution intuitions and think that the original sentences ($\sharp$) may seem to be true to us and the sentences ($\sharp^*$) which are obtained from them by a substitution of the synonymous singular terms may seem to

be false, despite the fact that we also know that these terms are synonymous (in virtue of being co-referential).

We shall reflect upon enlightened anti-substitution intuitions from our non-referential perspective. So the intuition is that, for instance, (2) may seem true to us and (2*) false, even though we know that ($2^{\dagger}$) is true.

(2) *C*lark Kent went *i*nto the phone booth and *S*uperman came *o*ut. ($Ic \wedge Os$.)

(2*) *S*uperman went *i*nto the phone booth and *C*lark Kent came *o*ut. ($Is \wedge Oc$.)

($2^{\dagger}$) *S*uperman $\ddot{=}$ *C*lark Kent. ($s \ddot{=} c$.)

Now, what can be said about this from the present perspective?[15] Perhaps, what might be relevant in this case is the difference of ($2^{\dagger}$) and ($2^{\ddagger}$) with respect to cognitive significance.

($2^{\ddagger}$) *S*uperman $\ddot{=}$ *S*uperman. ($s \ddot{=} s$.)

($2^{\dagger}$) seems to be informative, whereas ($2^{\ddagger}$) seems to express a triviality. In view of the fact that on the present account the senses—more exactly, the nominal definitions—of 'Superman' and 'Clark Kent' are exactly the same, we cannot explain the difference of ($2^{\dagger}$) and ($2^{\ddagger}$) in cognitive significance in terms the difference of the senses of these names. (We have illustrated this in Section 2 in terms of 'Hesperus' and 'Phosphorus'.) Looking to the level of sense, though, we can explain this difference in terms of sense-extensions. ($2^{\dagger}$) and ($2^{\ddagger}$) differ in *cognitive significance*, because 'Superman' and 'Clark Kent' have distinct sense-extensions. We say that the sense-extensions of two terms are identical just in case they contain exactly the same elements; and that they are distinct otherwise. (What matters here, of course, are unrestricted sense-extensions.)

To see that 'Superman' and 'Clark Kent' have distinct sense-extensions, it suffices to realize that the portions of these sense-extensions which contain elements which are composed from monadic pure predicates can never be the same. The sense-extension 'Superman', i.e. {..., Superman is gentle, ...}, will be distinct from that of 'Clark Kent', i.e. {..., Clark Kent is gentle, ...}.[16]

[15] I must admit that I am not sure whether I have enlightened anti-substitution intuitions.

[16] The presence of atomic sentences which are composed from monadic pure predicates in the sense-extension of a singular term is vital for the present account of cognitive significance. To realize this consider the highly artificial case of two constants a and b both having $\{Gab\}$ as their unconstrained common associate. According to our account, then, the sentences $a \ddot{=} b$ and $a \ddot{=} a$ will not differ in cognitive significance. This case does not only show a limitation of the theory. It also points out that the identity of the associates of a pair of nominal constants does not reduce to their typographical identity. With regard to the limitation, though, we might find consolation in the fact that this example is indeed highly artificial, as it is unlikely that these associates will represent the level of sense of an intuitively acceptable language. For instance, let a symbolize the numeral '2', let b symbolize the numeral '1', and let G symbolize the predicate $>$. On the assumption that the sense-extension of these numerals, i.e. {2 $>$ 1}, matches with the sense-extension of $>$ with respect to the sentence '2 $>$ 1', we won't be able—as the nominal definitions for the numerals and the meaning postulates for $>$ dictate—to claim also the

The intuitions of the enlightened which say that (2) is true and (2*) is false even though they know the truth of ($2^{\dagger}$) might be, I suggest, due to two central factors: (i) the fact that 'Superman' and 'Clark Kent' reflect distinct sense-extensions; and (ii) the fact that different portions of these sense-extensions are relevant for the truth of each of the conjuncts in (2) and (2*). This kind of explanation is also available in the other puzzle cases discussed above.

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truth of, e.g., '2 is a number' or '1 has a size' with respect to the level of sense. An intuitively appealing language, though, should allow monadic predication.

Quantifier Acquisition: Presuppositions of "every" *

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Abstract

Three components of determiner meanings – truth conditions, implicatures, and presuppositions – have been identified. One of the major findings in acquisition, related to the truth conditions of the quantifiers, has been that children go through at least two stages of non-adult interpretation of the quantifier *every* (Philip, 1995). More recently, researchers (Noveck, 2001; Gualmini *et al.*, 2001; Chierchia, 2001b; Papafragou & Musolino, 2003) have shown that children understand quantifiers logically in a context where adults derive scalar implicatures (for example, *some* vs. *all*). In this paper, I focus on the third component of the determiner meaning, presupposition. Using Felicity Judgment Task, I argue that children acquire the lexical presupposition earlier than the implicated presupposition, and that the acquisition path of implicated presupposition resembles more closely that of scalar implicatures.

1 Introduction

If I said the following sentences in (1), and if you know that I have no horns, just one nose, and two hands (rather than three), you might find my utterances strange.

(1) a. Every horn on my head is sharp.
b. Every nose of mine is red in this picture.
c. Every hand of mine is dirty.

A "better" way of expressing (1-b) and (1-c) would be the following (there is no better way of talking about how sharp my non-existent horn is):

(2) a. My nose is red in this picture.
b. Both hands of mine (=Both of my hands) are dirty.

*I would like to thank Uli Sauerland Francesca Foppolo, Orin Percus, and the audience at Sinn und Bedeutung, especially Irene Heim, for useful suggestions and discussions. All the remaining errors are, of course, my own.

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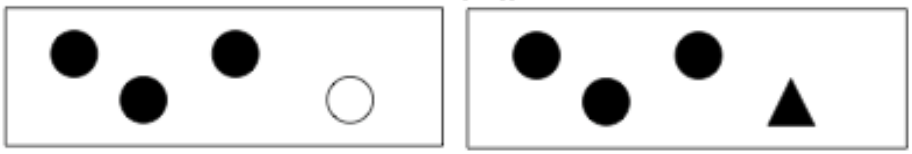
I assume that the reason adults feel that the sentences in (1) are strange is because these sentences violate presuppositions. What we try to find out in this paper is whether children also perceive the awkwardness of the sentences as in (1).

The topic of this paper is children's first language acquisition of presuppositions associated with determiners, in particular *every*. Three components of determiner meaning have been identified in semantics: truth conditions, implicatures, and presuppositions. The acquisition of truth conditions of determiners, mostly on the universal quantifier, has been investigated since 1960s (Inhelder & Piaget 1964; Roeper & Matthei 1974; Philip 1995; Crain & Thornton 1998, among others). One of the main findings in this area is that children go through at least two stages, where the comprehension of "every" is non-adult: In stage 1 approximately up to age 4, children would accept sentence (3) in both scenarios in (4). In stage 2 (approximately age 5 to 7), children reject sentence (3) as a description of either scenarios.

(3) Every circle is black.

(4)



As for implicatures, Noveck (2001) observed that children give "logical" responses much more frequently than adults do, when given a sentence with a scalar implicature items, such as *some*, and the results of other researchers' have corroborated his result (Papafragou & Musolino 2003; Chierchia 2001b; Gualmini *et al.* 2001 among others).

One remaining area that has not so far received much attention is the acquisition of presuppositions. It has been observed that the use of the definite determiner by children is not adult-like (Karmiloff-Smith (1979); Schaeffer & Matthewson (2005)), but not much else has been discussed so far. The main focus of this paper is to discuss the missing part, hoping to shed a new light on our understanding of children's acquisition of determiner meanings.

2 Two types of presuppositions

This paper bases its theoretical background on a theory of presupposition proposed by Heim (1991). Heim (1991) proposes that there are two types of presuppositions: lexical and implicated. According to her theory, lexical presuppositions are part of lexical meaning of a lexical item. Implicated presuppositions, on the other hand, are derived in much the same way as implicatures. Let us quickly review her theory, using definite and indefinite determiners.

Heim (1991) proposes that an expression of the form [*the* ζ] is associated with the following two presuppositions, shown in (5).

(5) a. Existence presupposition: There exists ζ.
b. Uniqueness presupposition: There is a unique ζ.

A clause of the form [*the* ζ]ξ has truth value just in case these two presuppositions are satisfied. That is, the use of the expression [*the* ζ] is limited to contexts where (i) there exists ζ, and (ii) there is a unique ζ.

This contrasts with the indefinite determiner *a*. Consider the contrast in (6). As marked by #, (6-a) is perceived strange by adult speakers. It sounds as if there are more than one biological father of the victim, and the speaker merely interviewed one of them. As our world knowledge tells us that this cannot be the case, the sentence is perceived strange.

(6) a. #I interviewed a biological father of the victim.
b. I interviewed the biological father of the victim.

It seems, then, that the use of the expression [*a* ζ] is compatible with a context where there is no unique ζ (and not compatible with a context where there is a unique ζ).

One way to explain the oddness perceived from (6-a) is to say that the indefinite determiner has a non-uniqueness presupposition, as shown in (7).

(7) [*a* ζ]ξ is:
a. true, if there are at least two ζ and at least one ζ is ξ.
b. false, if there are at least two ζ and neither ζ are ξ.
c. undefined, if there are less than two ζ.

This hypothesis, however, predicts that for the expression [*a* ζ]ξ to have a truth-value, there has to be at least two ζ, which is not in accord with our intuition, as Heim (1991) points out. It might well be that after surveying the matter further, it turns out that there is only one ζ in the world after all, and the use of [*a* ζ] allows this possibility.

Following Hawkins (1981), Heim proposes that the effect that we observe regarding the indefinite determiner can be explained by assuming that the indefinite determiner does not have any lexically specified presuppositions. The effect that we observe, that the expression [*a* ζ] cannot be used in a context where it is known that there is only one ζ, can be derived in much the same way as the scalar implicature, using a novel pragmatic maxim called *Maximize Presupposition*. Roughly speaking, Maximize Presupposition forces a speaker to use the expression that is associated with the strongest presuppositions possible that are compatible with the speaker's knowledge.

Between the definite and indefinite determiners, the definite determiner makes stronger presuppositions. This is so because the definite determiner is associated with two pre-

suppositions, while the indefinite determiner is not associated with any. When both presuppositions of the definite determiner are satisfied, therefore, the definite determiner *must* be used.

The contrast we observe in (6), therefore, is due to Maximize Presupposition. The definite determiner has two lexical presuppositions. Therefore, the use of the definite determiner is forced whenever these two presuppositions are met. That is, the expression [*the* ζ] must be used whenever there exists a ζ and there is a unique ζ in the context. When a speaker uses the indefinite determiner, on the other hand, it shows that at least one of the presuppositions of the definite determiner must not be met, according to the speaker's knowledge.

Let us now turn to the universal quantifier of English *every*, and German *jeder*. *Every* and *jeder* have the following three presuppositions (Sauerland (to appear)):

(8) a. Existence Presupposition
b. Anti-uniqueness presupposition
c. Anti-duality presupposition

The existence presupposition requires that the first argument of *every* not to be an empty set. This is why (1-a), repeated here in (9), is judged strange: in (9), the argument of *every*—a set formed by *a horn of mine*—would be an empty set, although the sentence presupposes that it should not be.

(9) #Every horn on my head is sharp.

The anti-uniqueness presupposition, on the other hand, is satisfied when the first argument of *every* is not a singleton-set. This is why (1-b), repeated here in (10-a), is perceived odd: there will be only one member in the set *a nose of mine*. The anti-duality presupposition prohibits the argument of *every* to be a set containing only two members, and hence, the awkwardness of (10-a). When these presuppositions are not met, the sentences are perceived odd.

(10) a. #Every nose of mine is red in this picture.
b. #Every hand of mine is dirty.

A sentence is either true or false only when these three presuppositions are satisfied.

Among the three presuppositions associated with *every*, only the existence presupposition is a lexical one. The other two, the anti-uniqueness and anti-duality presuppositions, are implicated presuppositions. That is to say that the anti-uniqueness and anti-duality presuppositions are not part of lexical meaning of *every*.

Recall that the definite determiner *the* has two lexical presuppositions: the existence and uniqueness presuppositions. This is why the use of *every* in (11-a) is strange, compared to (11-a), which is with the definite determiner *the*.

(11) a. #I interviewed every biological father of the victim.
b. I interviewed the biological father of the victim.

In a context where there is/can be only one biological father of the victim, the use of (11-a) is perceived strange, because its use implicates that the sentence that makes stronger presuppositions, (11-b), is not compatible with the actual world (because of the Maximize presupposition).

3 Scalar implicatures and their acquisition

Let us compare how scalar implicatures arise and how the implicated presuppositions are derived. Consider the following examples. It has been assumed that *some* and *all* are scalar alternatives. The use of the expression [*some* ζ] implicates that the use of [*all* ζ] is not compatible with the actual world. This is because the situations that are compatible with a sentence with *some* are a subset of the situations that are compatible with a sentence with *all*, and because of Grician reasoning (Maxim of Quantity), a speaker has to use *all* over *some*, if the actual world is compatible with the statement with *all*. Hence, if a speaker utters (12-a), the hearer concludes that (12-a) must not be compatible with the actual world, since if it were, the speaker would have used (12-a) instead of (12-a). Because of this reasoning, the speaker concludes that (12-c) must be true.

(12) a. Some children are 6 years old.
b. All the children are 6 years old.
c. Not all children are 6 years old.

This operation is reminiscent of what we have seen with the presuppositions. In fact, Heim (1991) proposes that they use at least partially the same mechanism.

Studies on the first language acquisition of scalar implicatures, therefore, are important precedent. In the language acquisition literature, Noveck (2001) was one of the first to report about children's acquisition of scalar implicatures.[1] Noveck (2001) observed that when asked to judge whether they agreed with the "underinformative" sentences, use of "some" when "all" is compatible with the actual world, children were more likely to give logical responses, agreeing to statements that are underinformative. Underinformative sentneces are truth-conditionally true statements, although they are pragmatically infelicitous because more informative sentences are actually compatible with the actual world. Some example sentences are shown below.

(13) a. Some giraffes have long necks. (cf. All giraffes have long necks.)

[1]Earlier studies include Braine & Rumain (1981) and Smith (1980)). Braine & Rumain (1981) have shown that children tended to use the disjunction *or* inclusively, while adults used it exclusively, which is the more pragmatic use of the disjunction. Smith (1980) showed that children treat *some* as being compatible with the situation where *all* must be used.

b. Some elephants have trunks. (cf. All elephants have trunks.)

While adults accepted underinformative sentences only 41% of time, children of ages 7-8 and 10-11 did so 89% and 85% of the time, respectively.[2]

If, in fact, the reason why children tend to give more logical responses than the adults do, accepting underinformative sentences more frequently, has something to do with the use of pragmatic mechanism, used for the calculation of the scalar implicatures, we predict that children should have the same kind of difficulties with the implicated presuppositions. With the result from the acquisition of scalar implicatures and Heim's theory of presupposition, we make the following predictions about the acquisition of presuppositions:

(14) a. The two types of presuppositions may be acquired differently. Specifically, we predict that lexical presuppositions are acquired earlier than the implicated ones.
b. The acquisition path of implicated presuppositions should correlate that of scalar implicatures.

The goal of the experiment that is presented in the next section is to find out whether these predictions are borne out.

4 Experiment: Felicity Judgment Task

In this experiment, we tested children's understanding of presuppositions associated with *every* and scalar implicature associated with *some* (some = not all), using Felicity Judgment Task.

4.1 Felicity Judgment Task

In Felicity Judgment task, the subject is first shown a context in the form of an acted out scenario or a picture. After the context is presented, two experimenters, each manipulating a puppet, offers different ways of depicting the context. The two alternative sentences are truth-conditionally equivalent, both being true. One of the sentences is more felicitous in the given context than the other, however. This task was designed to find out children's understanding of the felicity of a sentence within a given context (Gualmini *et al.* (2001); Chierchia (2001b))

This task was designed to find out children's understanding of the felicity of a sentence within a given context. The two sentences, therefore, are both truth-conditionally true, although one of the sentences is more felicitous in the given context than the other (Gualmini *et al.*, 2001; Chierchia, 2001b).

[2]Subsequent works by Gualmini *et al.* (2001); Chierchia (2001a) and Papafragou & Musolino (2003) all corroborate Noveck's result, although they show that different methodologies lead to varying results.

4.2 Goals

There were two goals with this experiment. One is to test whether children acquire implicated presuppositions differently from the lexical ones. Recall that our hypothesis is that children would acquire these two types of presuppositions differently. Furthermore, we hypothesize that children acquire lexical presuppositions earlier than the implicated ones. Our goal is to find out whether these two predictions are borne out. The second goal is to compare the acquisition path of the scalar implicature and that of implicated presupposition. As mentioned above, it has been observed that children do not derive the scalar implicatures as often as adults do. If this is due to the pragmatic mechanism required to derive scalar implicatures, and if the same mechanism is used in deriving implicated presuppositions, it is predicted that the acquisition paths of scalar implicatures and implicated presuppositions correlate.

4.3 Participants

Total of 120 children (30 children each from four different age groups, 6 (6;1–6;11, mean age=6;5), 7 (7;0–7;11, mean age=7;5), 8 (8;0–8;11, mean age =8;5), and 9 (9;0–9;9, mean age=9;4) years old) participated in this study. Children were recruited from two different public schools and one private school in Berlin, Germany. In addition, 21 adults (undergraduate student taking Introduction to Linguistics at Humboldt Universität zu Berlin) participated as control.

4.4 Materials and Procedure

In the present experiment, participants were presented with a series of 23 pictures, shown on a computer screen. For each picture, two alternative sentences were offered to the subject by two puppets that were manipulated by the experimenters. The alternative sentences described the context depicted in the pictures. After each puppet uttered its sentence, the subject was asked to reward the puppet who said it better by placing a bead in a box in front of each puppet. There were five items each of the three types of target constructions. Two lists were prepared, and subjects were randomly assigned to one of the lists. The lists were created in the following fashion: As there were 21 pictures (excluding two warm up items/pictures), we divided the pictures into two groups (10 and 11 pictures in each group). In one of the lists, the Experimenter 1 uttered the more felicitous sentences for the first group of pictures, and in the other lists, she uttered the more felicitous sentences for the second group of pictures. The order of the pictures remained constant.

The three conditions, as described in section 4.2, are scalar implicature, implicated presupposition, and lexical presupposition. To test the acquisition of scalar implicature, we used the contrast between *einige* 'some' and *alle* 'all'. One of the pictures used for this condition and the sentences presented for this picture is shown in (15).[3] In (15),

[3]The pictures were originally created and used by F. Foppolo (2006), in Italian. I thank Francesca

there are five chipmunks in the context, and all five of them are waking up. The sentence with *einige* ‘some’ and the one with *alle* ‘all’ are both truth conditionally true, but the sentence with *alle* is more informative than the sentence with *einige*. As the sentence with the more informative alternative, *alle*, is compatible with the actual world (the picture), the speaker must choose/utter the sentence with *alle* over the one with *einige*. That is, the sentence with *alle* is the more felicitous alternative between the two. If the subject is capable of calculating the scalar implicatures, he/she should reward the puppet which uttered the sentence with *alle*.

(15) a. Alle Streifenhörnchen wachen auf.
all chipmunks wake up
‘All the chipmunks are waking up.
b. Einige Strefenhörnchen wachen auf.
some chipmunks wake up
‘Some chipmunks are waking up.

To test the acquisition of implicated presuppositions, we used one of the implicated presuppositions associated with *jeder* ‘every’, namely, the anti-uniqueness presupposition. A sentence with *jeder* and the one with the definite determiner, *der/die/das* ‘the’, were

Foppolo for letting me use her pictures. The sentences, which were originally in Italian, were translated into German.

presented as the two alternative sentences. The reason *der/die/das* is the alternative for *jeder* in this condition is because *der* has the lexical existence and uniqueness presuppositions, while the only lexical presupposition of *jeder* is the existence presupposition. Hence, when both of the presuppositions are satisfied, a speaker has to use *der*, rather than *jeder* because of Maximize Presupposition.

One of the pictures used for this condition and the alternative sentences presented for this picture are shown in (16). There is a girl playing soccer in the picture. Both of the presuppositions associated with the definite determiner *das*–the existence and uniqueness presuppositions–are satisfied in the context, and hence, the sentence in (16-a) must be used over the one in (16-a). That is, while both (16-a) and (16-a) are truth-conditionallly true, (16-a) is more felicitous than (16-a), and therefore, a speaker must use (16-a) in the context in (16).

(16) a. Das Mädchen hier spielt Fussball.
the girl here plays soccer
'The girl here is playing soccer.'
b. Jedes Mädchen hier spielt Fussball.
every girl here plays soccer
'Every girl here is playing soccer.'

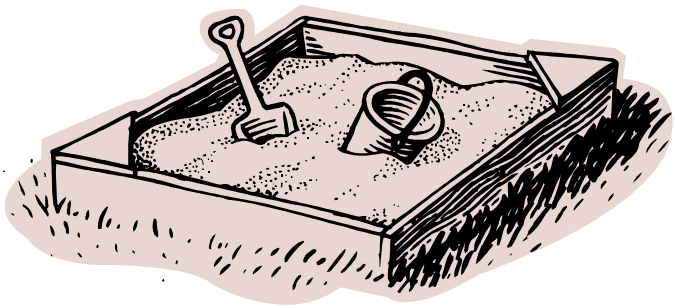
To test the acquisition of lexical presupposition, we used the lexical presupposition associated with *jeder*, the existence presupposition. Subjects were presented with a sentence with *jeder* and its alternative sentence with *kein* 'no'.

The alternative sentence that was offered contained the lexical item *kein* 'no'. *Kein* ζ denies the existence of ζ, therefore, is the relevant alternative to *jeder* with respect to the existence presupposition. We did not use a minimal pair for this paradigm, however, but instead, used *kein* in a construction with an expletive. This construction was chosen because it seems that *kein* ζ has an existence presupposition when it is in the sentence initial position, as in (17-a), compared to non-sentence initial position as in (17-a), or in a construction with an expletive, as in (17-c). (17-c) was chosen because (17-c) more clearly denies the existence, compared to (17-a).

(17) a. Keine Frau sitzt auf dem Stuhl.
no woman sits on the chair
‘No woman is sitting on the chair.’
b. Hier sitzt keine Frau auf dem Stuhl.
here sits no woman on the chair
‘No woman is sitting on the chair.’
c. Hier gibt es keine Frau, die auf dem Stuhl sitzt.
here exists it no woman who on the sofa sits
‘There exists no woman who is sitting on the chair here.’

An example from this condition and the sentences for the picture are shown in (18).

(18) a. Hier gibt es kein Mädchen, das im Sandkasten spielt.
here exists there no girl that in-the sandbox plays
‘There is no girl here that is playing in the sandbox.’
b. Jedes Mädchen hier spielt im Sandkasten.
every girl here plays in-the sandbox
‘Every girl here is playing in the sandbox.’



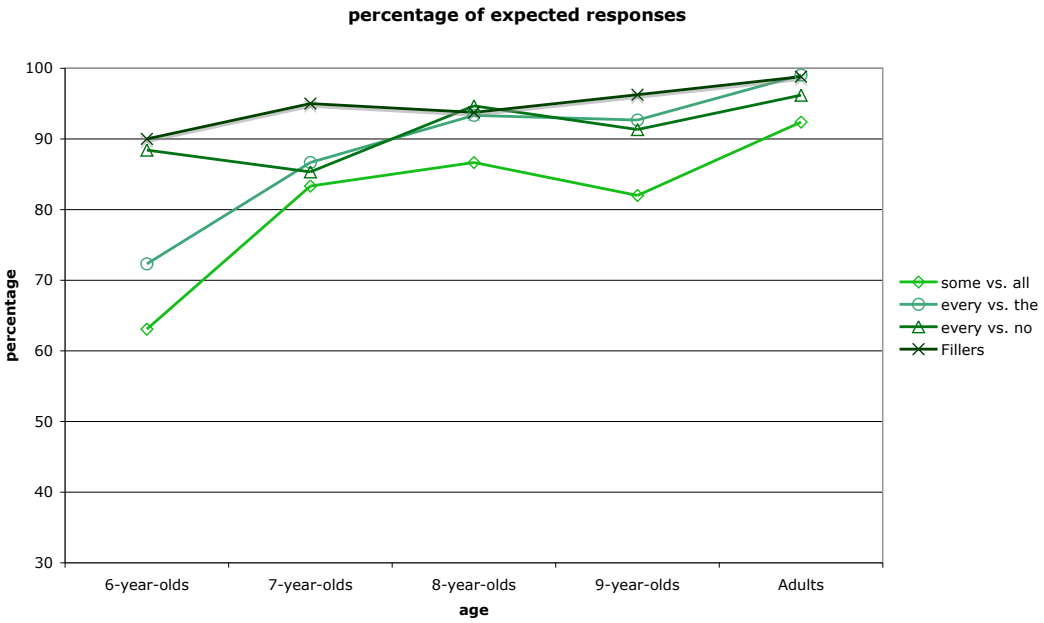
There were 5 pictures for each of the three types of target conditions. There were two warm-up items at the beginning of the experiment for familiarization purposes. There were 6 filler items.

4.5 Result

The graph in (19) shows how often a subject gave an “expected response”. An expected response here is to choose the more felicitous alternative between the two sentences presented for the picture.

As can be seen in (19), the rate of expected responses is lower for the items for *einige vs. alle* ‘some vs. all’ and for *jeder vs. der* ‘every vs. the’ for the six-year-olds than that for *jeder vs. kein* ‘every vs. no’. The rate of expected responses for both conditions go up,

however, for the seven-year-olds. Statistical analysis (Wilcoxon test) showed that the differences between the rate of expected responses for six-year-olds and seven-year-olds were statistically significant for *einige vs. alle* and *jeder vs. der*, but not for *jeder vs. kein* (P=0.0002 for *einige vs. alle*, P=0.0016 for *jeder vs. der*, but P=0.12 for *jeder vs. kein*. A second test, Friedman-Test, confirmed this result as well.)



Recall that one of the predictions was that children acquire lexical presuppositions earlier than implicated presuppositions. According to the result shown above, the prediction seems to be borne out.

4.6 *Beide* 'both'-responses

There were a number of children who expressed that both alternatives were fine for the given context (henceforth, *beide*-responses). Following is a list that shows how many items per age and condition were responded as both alternatives being acceptable for the given context.

type of items	6-yr-olds	7-yr-olds	8-yr-olds	9-yr-olds	total
some vs. all	35/150	11/150	11/150	7/150	64
every vs. the	29/150	10/150	7/150	3/150	49
every vs. no	0/150	0/150	2/150	0/150	2
Fillers	2/240	1/240	1/240	0/240	4
total	66	22	21	10	119

There were total of 24 subjects (11 6-year-olds, four 7-year-olds, six 8-year-olds, three 9-year-olds) who gave the *beide*-response to at least one of the items. Among the three target conditions, 53.8% of the *beide*-responses were obtained with the scalar implicature items, and 41.2% of them occurred with the implicated presupposition items. There were only two trials from the lexical presupposition items in which a subject gave the *beide*-responses (only one subject)[4].

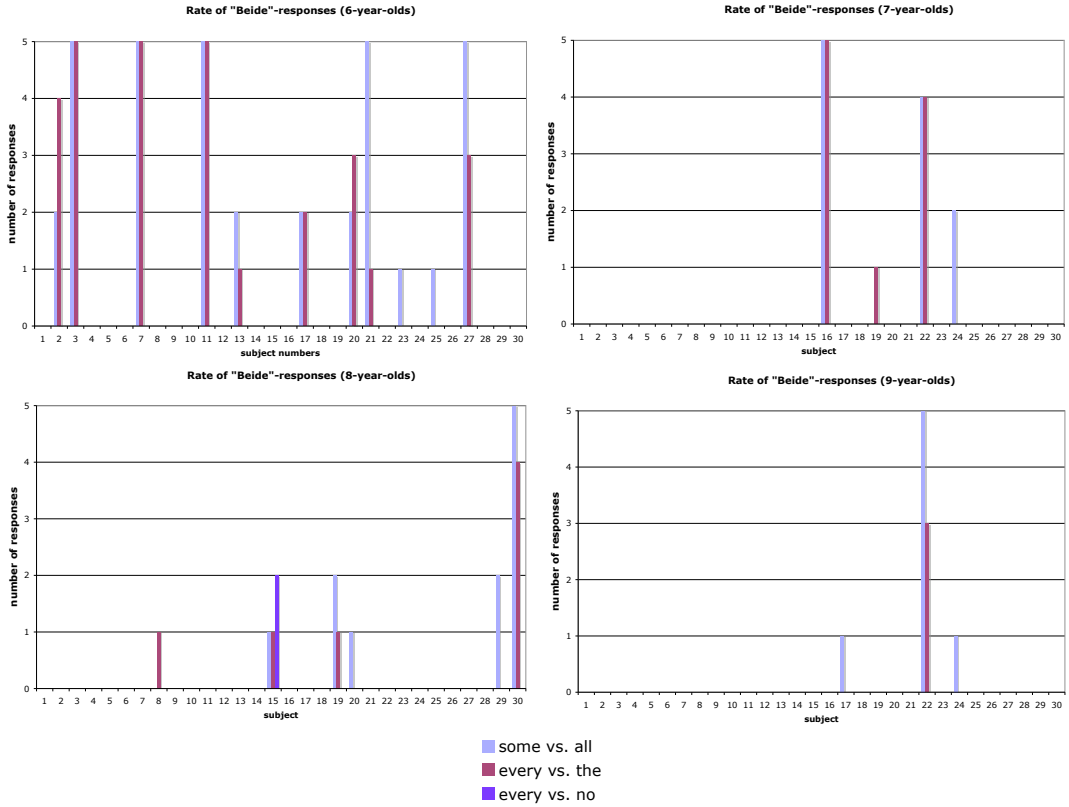
It should be noted that choosing both alternatives to be acceptable was not an option offered to the subjects. We introduced the experiment as a game called *Wer hat es besser gesagt?* ('who said it better?'), encouraging the subjects to choose only one of the puppets who "said it better". It suggests, therefore, that for those subjects who gave the *beide*-response, the two alternative sentences were equally felicitous in the given context.

Although further investigation is necessary to explain why some of the subjects gave *beide*-responses at all, I would like to point out that 95% of the *beide*-responses occurred with the *scalar implicature* and *implicated presupposition* items. As discussed in earlier sections, one difference between the existence presupposition on the one hand and the anti-uniqueness presupposition and scalar implicature, on the other, is that the former is a part of lexical meaning of the lexical item *jeder*, while the latter arises due to pragmatic mechanisms (Maximize Presupposition and Maxim of Quantity). It may be that children have difficulties with these pragmatic maxims.

Let us discuss about the subjects who gave the *beide*-response to at least one of the items. The general trend is that many of the subjects who gave the *beide*-response to the implicated presupposition did so to the scalar implicature items as well. Consider 6-year-olds as an example. There were 11 6-year-olds who gave the *beide*-response to at least one of the items. Among these 11 children, nine of them gave the *beide*-response to both scalar implicature and implicated presuppositions. Two of them gave the *beide*-response only to a scalar implicature item. It seems, therefore, that there is some kind of dependency between the *beide*-responses for the implicated presupposition conditions and that for the scalar implicature conditions.

[4]There were two adult control subjects who gave the *beide*-response to one of the *einige vs. alle* condition items.

(19)



Statistical analysis (two-tailed Fisher Exact Test) reveals that the significance of the association between the *beide*-response for the anti-uniqueness presupposition and that for scalar implicature (independent of age) is statistically significant (P=4.3e-12, Phi coefficient=0.73).

5 Conclusion

What we tried to do in this paper is to investigate whether we find support for Heim's (1991) theory of presuppositions from the first language acquisition of presuppositions associated with the universal quantifier. We have designed an experiment to test following two hypotheses: (1) the Lexical presupposition of an item is acquired earlier than the implicated presupposition of the same item; (2) the acquisition of implicated presuppositions take similar path as that of scalar implicatures.

Using Felicity Judgment task, it was shown that the lexical presupposition associated with *jeder*, the existence presupposition, is acquired earlier than the implicated one, the anti-uniqueness presupposition, confirming the first prediction.

Although we do not have concrete evidence for the second hypothesis, there are a couple of phenomena that group the implicated presupposition and scalar implicature acquisi-

tion together. One is how the rate of expected responses go up from the age 6 to age 7. The statistical analysis showed that the difference between the rate we obtained from the 6-year-olds and that from the 7-year-olds are significant only for the scalar implicature items and implicated presuppositions, and not for the lexical presupposition.

The second is the *beide*-responses. It was shown that children accepting both alternatives for a given context occurred mostly with the scalar implicature and implicated presupposition items, only one subject gave this type of response to the lexical presupposition item. Statistical analysis confirmed that the association between the *beide*-response for the anti-uniqueness presupposition items and that for the scalar implicature items was significant.

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