Discourse Linking and Discourse Subordination

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Roberts (1989) described subordination phenomena in discourse, where covert restrictors of various quantifiers are somehow copied from prior representations. Now in connection with plural pronouns, Kamp & Reyle (1993) have proposed a construction rule that can provide the key to a more principled account of discourse subordination on the basis of a formal analysis of discourse linking as suggested by Enç (1991). The result is a partial answer to the question asked by Partee (1993): How do implicit (parts of or all of) restrictive clauses get introduced into the semantic interpretation? This answer is: Frequently not by way of accommodation but through set anaphora and a general set description and reduction rule.

1 Introduction

Restrictive clause formation, or quantificational domain selection, is determined in part by syntax, in part by more pragmatic factors. As it appears, these factors include, on the one hand, **accommodation**, where the presupposition trigger in the nuclear scope may be phonological ('association with focus'), and, on the other hand, what may be termed **linking**, where material from the context is incorporated into the restrictor. When this material is apparently inaccessible, we can speak of **subordination**. This paper, unlike several other contributions to this volume, is concerned with the second form of non–syntactical restrictive clause formation. The aim is to link together recent approaches to three special forms of anaphoric connections with a view to a uniform picture of how material from the context enters into restrictive clauses of quantificational structures: Implicit partitivity as defined by Enç (1991), dependent plural pronouns as analyzed by Kamp & Reyle (1993), and discourse subordination as described by Roberts (1989). Specifically, the intention is to develop a precise and general notion of 'discourse linking', or specificity, two terms used by Enç to describe the context–dependency of the NP in the second sentence in a discourse like (1), and to apply it to the phenomena termed 'discourse subordination' to indicate how the second sentence in a text like (2) is somehow subordinate to the first.

(1)   The Swedish team played remarkably well in the humid heat.
      Two attackers were particularly brilliant.

(2)   My mother surprisingly often wins something at bazaars.
       Mostly, it's a teddy bear.

The special context–dependency in the second sentence in (2) is underscored by the fact that the pronoun apparently has no accessible antecedent. Enç accounts for cases like (1) by defining a 'specific sense' of noun phrases in terms of 'second–order definiteness': The two attackers are required to form a subset of a contextually established set, in this case, the Swedish team. Now this analysis carries over naturally to the so–called pronominal use of determiners (Westerståhl 1985), as in (3). Note that the problem of pronoun resolution from (2) can occur with this use as well, as witnessed by (4).

(3)   The Swedish players did remarkably well in the humid heat.
       Two were particularly brilliant.
(4)   Several women won a teddy bear at the bazaar.
       Most handed it back.

So there is reason to try to develop the analysis of specificity in such a way that it can account for the apparently empty restrictor in the case of 'D– (determiner) quantification' as in (4) and in the case of 'A– (adverb) quantification' as in (2) alike. Set in DRT, the specificity analysis says that the restrictor in (3) or (4) is represented as $\langle \{u\}, \{u \in U\} \rangle$ where U is anaphoric. By itself, this does not yield a proper antecedent for the pronoun in (4). However, in their theory of plural anaphora Kamp & Reyle have proposed a rather special rule to take care of the anaphoric relationships in cases like (5).

(5)   Several women won a teddy bear at the bazaar.
       They all handed them back.

This rule specifies that when the restrictor of the distribution quantifier contains (just) a condition $u \in U$ where U is anaphoric on a set described in the context, that description can replace U and the resulting condition can be reduced. If this rule is generalized to cover any quantificational force and quantification over events, both 'D–subordination' as in (4) and 'A–subordination' as in (2) are accounted for in a rule–governed way.

The paper consists of four further sections. In section 2, I review the analysis of (some) so-called strong readings of de se weak noun phrases proposed by Enç (1991), rephrase this concept of specificity in Discourse Representation Theory, and relate it to the concept of context sets introduced by Westerståhl (1985), in particular to what he called the pronominal use of determiners. In section 3, I present the *Rule for distribution over a set obtained by Abstraction* proposed by Kamp & Reyle (1993) and show that a similar rule is relevant for all cases of specificity (discourse linking), including the pronominal use of determiners. In the core section 4, finally, I extend the generalized rule to specificity uses of adverbs of quantification and show that this step from objects to events provides exactly an adequate analysis of the phenomena labelled *discourse subordination*. Also in this section, I discuss an interesting case of interaction between focus and subordination, and in a concluding section, I compare the two major non–syntactical forms of restrictive clause formation, accommodation and linking.

2 Discourse Linking

There has been a renewed interest in the semantics of NPs, in particular, in Milsark's (1977) distinction between a weak and a strong reading of indefinite and cardinal NPs. Partee (1989), Enç (1991), de Hoop (1991), van Deemter (1992), and Diesing (1992) agree that such NPs have beside their weak reading a reading to be characterized as presuppositional, specific, partitive, anaphoric, or quantificational. Milsark noted that on the strong reading the sentence (6)a. is "very nearly synonymous with" (6)b. In this section, one approach to this and similar forms of implicit partitivity will be assessed.

(6)　a.　Some salesmen walked in.
　　　b.　Some of the salesmen walked in.

2.1 Specificity according to Enç

Enç identifies a certain concept of **specificity** as the crucial characteristic of NP strength, referring to Pesetsky's (1987) notion of 'D–Linking' (D for discourse): Specifics require that their discourse referents be linked to previously established discourse referents. For the discourse (7)a. to be coherent, the NP "two girls" must be read in the specific sense. This sense, Enç claims, is equivalent with the overt partitive construction in (7)b.

(7)　a.　Several children entered my room. I knew two girls.
　　　b.　I knew two of the girls.

Though there is scarce evidence that in English, the specific sense constitutes a separate reading, in Turkish the distinction correlates with case, and even in English, the specific sense is impossible in "there" sentences. Accentuation is another structural constraint: As evident from the contrasts in (8), the specific–nonspecific alternation may correspond to distinct intonational patterns, specific noun phrases showing the characteristic contour of (sentence) topics. They will probably count as 'links' in the theory of Vallduví (1992 and this volume).

(8)　　　There was a knock at the door. Some SALESmen walked in.
　　?　Several people were waiting at the door. Some SALESmen walked in.
　　　　Several people were waiting at the door. Some SALESmen walked IN.

(On the role of intonation in relation to partitive readings, cf. Büring and Jäger (this volume).) Apart from this, the situation in English resembles the situation in most Slavic languages, with no morphological distinction between definiteness and indefiniteness. And in fact, on Enç's formal analysis, set in an extended File Change Semantics where an NP carries a pair of referential indices, specificity is indirect definiteness, or second–order familiarity:

> **Specificity according to Enç**
>
> Every $[_{\text{NP}}\ \alpha]_{\langle i,j \rangle}$ is interpreted as $\alpha(x_i)$ and
>
> $x_i \subseteq x_j$ if $\text{NP}_{\langle i,j \rangle}$ is plural,
>
> $\{x_i\} \subseteq x_j$ if $\text{NP}_{\langle i,j \rangle}$ is singular.
>
> An NP is specific if and only if its second index is definite.

2.2 Specificity in Discourse Representation Theory

It is useful to rephrase this analysis of noun phrase specificity in DRT terms. This is straightforward as far as discourse referents are concerned, but in one respect the 'second–index definiteness' formulation turns out to be too unspecific: We are faced with the choice of whether to represent the $\overline{\mathrm{N}}$ constituent as a condition in the assertion or in the presupposition structure. In the latter case, the specific reading is exactly like the corresponding overt partitive, whereas in the former case, there is a slight difference between (7)a. and b., a. asserting and b. presupposing that there were girls (among the children entering). To maybe see the difference more clearly, consider (9), which seems to assert that the Shrove collection included etchings – there is no implication, as there would be with the corresponding overt partitive "some of the etchings", that not all the etchings were particularly popular:

(9)   The Shrove collection fetched good prices at Sotheby's last Thursday.
       Some etchings were particularly popular.

On the other hand, if in a sentence like (6)a. the noun "salesmen" is deaccented, it is probably better represented as a presupposed condition. Either way, the discourse referent for the specific noun phrase is required to be an element or a subset of a set introduced in the presupposition structure and thus, on an anaphoric account of presupposition as in van der Sandt (1992) or Sæbø (1996), to be identified with another set referent in the discourse. Choosing the former alternative, the assertion part of the second sentence in (7)a. can be represented as follows.

$$\langle \{\zeta\}, \{\zeta = \Sigma y : \langle \{y\}, \{\mathrm{girl}(y), \, y \in \xi, \, \mathrm{I \ knew \ y}\}\rangle, |\zeta| = 2\}\rangle$$

The set referent ξ will be introduced in the representation of the presupposition of the sentence, so that it must be mapped onto some previously introduced set referent, in this case, the one for the children entering my room.

Specific NPs pattern with strong NPs with regard to structural constraints like case marking in a language like Turkish or the 'definiteness effect' in English (though not in Dutch, where even overt partitive NPs can occur in "er" constructions). And in fact, Enç regards any proportional NP as partitive ("all quantifiers are specific"). However, this is implausible in the face of discourses like (10), where the NP "two boys" in the second sentence is specific but the NP "most boys" in the third sentence is not.

(10)   Several children entered the museum. I saw two boys at the movies.
       Most boys are bored by museums.

As it appears, the claim that quantificational NPs are inherently specific cannot be substantiated. The structural analogy between proportional and specific (including definite) NPs must be explained at another level. By the same token, some alleged 'strong' senses of 'weak' NPs seem not to be captured by the Enç notion, notably such triggered by individual-level predicates as in "some dolphins are intelligent", which, as pointed out by Abbott (1993), is appropriate in a discourse without a superset.

2.3   The Pronominal Use of Determiners

The notion of specificity under discussion is strongly reminiscent of the concept of **context sets** introduced by Westerståhl (1985) to describe how the domains of generalized quantifiers are typically narrowed down intersententially. The most striking instance of the phenomenon is the case of **bare determiners**. Westerståhl called the use of determiners witnessed in (11) the **pronominal** use. On the reasonable assumption that this corresponds to the specific reading of an NP with an empty $\overline{\text{N}}$, the empty restrictor of the quantifier will be represented as $\langle \{y\}, \{y \in \xi\} \rangle$ where ξ is introduced in the presupposition structure.

(11)   (The park at Shrove was seriously damaged in the hurricane.
         Many trees were destroyed.) Most were uprooted, while some were ...

The assertion part of the sentence "most were uprooted" could be represented as follows.

$$\langle \emptyset, \{\text{most}_y(\langle \{y\}, \{y \in \xi\} \rangle, \langle \emptyset, \{\text{uprooted}(y)\} \rangle)\} \rangle$$

Are bare determiners always anaphoric in the sense that the empty restrictor must be filled by a context set — is the pronominal use invariably definite? If so, there ought to be a reason, and it appears that the specific sense prevails with most determiners in English (but note the default 'people' set in cases like "many are called, but few are chosen"). Now it is generally agreed that the sets denoted by the restrictors of strong determiners like "every" or "most" are presupposed to be nonempty (cf. Partee (1989), where strong interpretations of weak noun phrases are attributed to a corresponding presupposition). Thus a sentence "most Grieg symphonies have three movements" presupposes that Grieg wrote some symphonies. This does not yet imply that the restrictors are anaphoric; as Abbott (1993) points out, there is a difference between presupposing the nonemptiness of the set and requiring the discourse existence of some group possessing the property. However, according to the theory of anaphoric presuppositions developed in Sæbø (1994), what happens when a presupposition involves a referent which does not act as a constant is that that referent acquires an anaphoric interpretation. This is due to the principle that the presupposition structure is proper (containing no free occurrences of referents) so the referent must be in the presupposition's universe, which is to say that it must be mapped to some previously introduced referent. And this is the case when the restrictor is zero, as in a sentence "most have three movements": The variable set referent in the nonemptiness condition must be in the presupposition's universe, the locus for anaphora. Such an explanation would apply to proportional quantifiers, where a tripartite structure with a nonemptiness presupposition associated with the restrictor is unproblematic, but not without qualification to cardinal or indefinite 'quantifiers'. For the time being, we have to say with Partee (1989) that there is a presuppositional interpretation available for noun phrases with such determiners (even in connection with stage–level predicates), often enough a specific interpretation, and the question remains why this interpretation seems to be systematically selected by bare determiners.

3 Set Description and Reduction in Discourse Representation Theory

In the theory of plural anaphora in Kamp & Reyle (1993), a plural antecedent can take two forms, both of which are relevant for the covert set anaphor involved in specificity:

- A referent introduced on account of an (in)definite NP or the sum of such referents
- A referent introduced by abstraction on a duplex condition constructed from a (cardinality or proportional) quantifier

3.1 Abstraction

The crucial characteristic of the latter case is that the antecedent set referent, say ζ, is associated with a condition $\zeta = \Sigma y{:}\langle\{y, \ldots\}, \{\ldots\}\rangle$, that is, the referent is defined as the set of, say y, such that $\ldots$.[1] The introduction of the referent ζ and its identification with the construct $\Sigma y{:}\langle\{y, \ldots\}, \{\ldots\}\rangle$ are the result of Abstraction on a duplex condition (or the direct result of construction on the basis of a cardinal NP, cf. pp. 452ff.). The rule of Abstraction says (p. 344) that once a tripartite structure has been constructed from a sentence like (12), the two structures representing the restrictor and the scope may be merged into one structure K and a set referent S with a condition $S = \Sigma y{:}K$ may be introduced for any y in the universe of K.

(12)   Most paintings lost in the art robbery have been recovered.

In this case, Abstraction permits the construction of the set of paintings that have been recovered, and this set can serve as antecedent for a variety of overt and covert anaphors. The discourse can now continue with either one of, for instance, (13)a.–c., where a. contains a plural pronoun, b. a 'specific' full NP, and c. a bare determiner.

(13) a. They are now stored in the basement.
      b. Two Munch pieces were purchased back.
      c. Several have suffered minor damage.

3.2 The Rule CR.DA

Now in order to account for the way the 'dependent plural' pronoun "them" is resolved in a discourse like (14), Kamp & Reyle (K&R) propose a special construction rule CR.DA, "Rule for distribution over a set obtained by Abstraction" (p. 389).

(14)   Every director gave a present to a child from the orphanage.
        They opened them right away.

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[1]Actually, in model theory, Kamp & Reyle do not treat plural entities as sets but as non–atoms in a lattice structure. But as far as representations are concerned, they use set terminology for convenience.

The problem is this. Abstraction on the basis of the first sentence provides both the set of children given a present by a director and the set of presents given to a child by a director, but the intended reading is not that all members of the former set opened some member of the latter set and that all members of the latter set were opened by some member of the former; rather, it is that the children opened their **respective** presents right away. This is accomplished by CR.DA. Informally, the rule prescribes what amounts to a set-theoretical reduction at DRS level: Whenever the restrictive clause of the distribution ("every") operator has the form $\langle\{u\}, \{u \in U\}\rangle$ and U is identified by anaphoric resolution with a set referent Z identified by description, U may be replaced by the description of Z and the resulting condition $u \in \Sigma z : \langle \ldots \rangle$ may be reduced. In this way, the representation of "they" in (14) becomes the same as for "every child given a present by a director", so that the atomic present referent becomes accessible to the pronoun "them".[2]

> "When a set is introduced via Abstraction over some duplex condition δ, then the information contained in the constituent DRSs of δ is available as information concerning the members of that set. This means that when we distribute over such a set, the DRS occurring on the right–hand side of the Abstraction equation may be "copied" into the left–hand DRS of the duplex condition which the distribution operation introduces." (p. 379)

3.3   Generalizing CR.DA

As it stands, the "Rule for distribution over a set obtained by Abstraction" may seem very limited in scope. It is not obvious that the complexity of it is entirely justified by the problem it is designed to solve. But the ingredients of the rule may appear as less ad–hoc if they can be shown to have a wider field of application. As I believe, the principle of set description and reduction in discourse representation is not necessarily so specialized as one is led to expect by CR.DA. This rule can be generalized to cover a range of problematic phenomena, ultimately that of 'modal subordination'. Note to begin with that a rule in the spirit of CR.DA is highly relevant not only for distribution in connection with plural pronouns, but also for specific (discourse–linked) NPs:

(15) Every director gave a present to a child from the orphanage.
       Two boys opened it right away.
(16) Most books contain a table of contents. In some, it is at the end.
       (Heim 1990)

This shows that Kamp's & Reyle's CR.DA is too narrow in scope: The principle that a set referent S may be replaced by the description of S and the resulting

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[2]Note that the result of the rule is in all interesting cases a duplex condition with an indirect binding structure: "Every child given a present opened it" is a 'donkey' sentence. In K&R, although the 'donkey' referent in the restrictor is an accessible antecedent for the pronoun in the scope, the determiner quantifies over the 'farmer' referent only, and the proportion problem is deferred to the model theory.

condition $u \in \Sigma z : \langle \ldots \rangle$ may be reduced is not confined to distribution. (15) is an example of a specific full NP, and (16) is an example of a bare determiner. (15) resembles (14) closely, but whereas in (14) the condition $u \in U$, where U is anaphoric, is the only condition in the restrictor of the (universal) distribution quantifier applying to the set referent introduced by the anaphor "they", in (15) it is an extra condition in the restrictor of the quantifier "two" in the specific noun phrase.[3] In (16), that condition is again the only condition in a restrictor, but this time the quantifier is the bare determiner "some" in its pronominal use. Let us focus on the steps in the construction of the representation for this discourse.[4] The first step is the construction of the duplex condition from the first sentence; the second is the application of Abstraction to form the set of books containing a table of contents:

(i) $\mathrm{most}_x(\langle \{x\}, \{\mathrm{book}(x)\}\rangle, \langle \{y\}, \{\mathrm{toc}(y), \text{x contains y}\}\rangle)$

(ii) $\zeta = \Sigma x : \langle \{x, y\}, \{\mathrm{book}(x), \mathrm{toc}(y), \text{x contains y}\}\rangle$

The third and fourth steps are the construction of the preliminary representation for the second sentence and the resolution of the anaphoric set referent; its identification with the set referent previously introduced through Abstraction:

(iii) $\mathrm{some}_z(\langle \{z\}, \{z \in \xi\}\rangle, \langle \emptyset, \{\text{it is at the end in z}\}\rangle)$

(iv) $\mathrm{some}_z(\langle \{z\}, \{z \in \zeta\}\rangle, \langle \emptyset, \{\text{it is at the end in z}\}\rangle)$

The fifth step consists in the replacement of that set referent by its previous description inside the restrictor of condition (iv), and step (vi), finally, consists in the reduction of the resulting condition, raising the referent y into the universe of the restrictor structure, and the resolution of the pronoun; its identification with the now accessible referent y:

(v) $\mathrm{some}_z(\langle \{z\}, \{z \in \Sigma x : \langle \{x, y\}, \{\mathrm{book}(x), \mathrm{toc}(y), \text{x contains y}\}\rangle\}\rangle,$
      $\langle \emptyset, \{\text{it is at the end in z}\}\rangle)$

(vi) $\mathrm{some}_z(\langle \{z, y\}, \{\mathrm{book}(z), \mathrm{toc}(y), \text{z contains y}\}\rangle, \langle \emptyset, \{\text{y is at the end in z}\}\rangle)$

4   Discourse Subordination

Beside modal subordination in the narrow sense, as in (17), Roberts (1989) treats 'quantifier subordination', as in (16), in general, 'discourse subordination', where the relevant operator may be a modal, a determiner, or a quantificational adverb, as in (18).

(17)   A thief might break into the house. He would take the silver.

(18)   Mary always wears a dress. Usually, it has polka dots. (Kratzer 1988)

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[3]This cardinal quantifier does not necessarily impose a tripartite structure; if the second sentence in (15) is represented directly as a cardinality structure, the condition $u \in U$ is an extra condition in the description of the set of cardinality two of boys opening "it" right away.

[4]It should be said that if "some" is construed as an indefinite NP (cf. K&R 1993: 332ff.), the adaptation of the rule is not so straightforward; however, a quantificational structure is perhaps not implausible for this 'strong reading' "some" phrase.

> "In the formal theory developed here, where accommodation takes place at the DRS level of representation, the requirement under consideration might be expressed as a stipulation that if the accommodated material includes the antecedent of a pronoun in the modally subordinate clause, that material must be borrowed from a prior representation." (p. 705)
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> "In each case, the second sentence in a discourse is interpreted as involving an operator (explicit or implicit) whose force is relativized so that it ranges only over the type of situation given in part by the first sentence." (p. 717)

This is the closest that Roberts in her 1989 paper comes to a precise formulation of the mechanisms underlying discourse subordination. However, a generalization of Kamp's & Reyle's DRS set description and reduction rule coupled with a second–order definiteness analysis of (bare determiner) specific NPs can account for cases like (15) and (16) in an explicit way, as the last section was meant to show. And this section is meant to show that a further generalization can provide a fruitful basis for the analysis of cases like (18) as well. A 'D–Linking' analysis of 'bare' adverbs of quantification, without overt restrictors, implies that whatever the adverb quantifies over be drawn from a familiar set; and once this set is identified, its description can be transferred to the restrictive clause to supply pronouns in the nuclear scope with proper antecedents.

4.1   From Objects to Events

On the face of it, things look a bit more complicated with adverbs than with determiners: Possibly they quantify over tuples of various kinds of variables ('cases'), and in that case, one needs 'unselective' versions of operations like abstraction. Possibly, however, it suffices to operate with event(uality) variables, as argued in de Swart (1993) and Skeie (1994). Let us look at how a case like (18) could be represented stepwise along the same lines as (16):

(i) $\text{every}_e(\langle\{e, y\}, \{\text{Mary(x)}, e\text{: x wears y}\}\rangle, \langle\emptyset, \{\text{dress(y)}\}\rangle)$

(ii) $\zeta = \Sigma e\text{:}\langle\{e, y\}, \{\text{Mary(x)}, \text{dress(y)}, e\text{: x wears y}\}\rangle$

(iii) $\text{GEN}_\varepsilon(\langle\{\varepsilon\}, \{\varepsilon \in \xi\}\rangle, \langle\emptyset, \{\text{it has polka dots}\}\rangle)$

(iv) $\text{GEN}_\varepsilon(\langle\{\varepsilon\}, \{\varepsilon \in \zeta\}\rangle, \langle\emptyset, \{\text{it has polka dots}\}\rangle)$

(v) $\text{GEN}_\varepsilon(\langle\{\varepsilon\}, \{\varepsilon \in \Sigma e\text{:}\langle\{e, y\}, \{\text{Mary(x)}, \text{dress(y)}, e\text{: x wears y}\}\rangle\}\rangle,$
        $\langle\emptyset, \{\text{it has polka dots}\}\rangle)$

(vi) $\text{GEN}_\varepsilon(\langle\{\varepsilon, y\}, \{\text{Mary(x)}, \text{dress(y)}, \varepsilon\text{: x wears y}\}\rangle\rangle,$
        $\langle\emptyset, \{\text{y has polka dots}\}\rangle)$

The first line is the duplex condition constructed from the first sentence in the discourse. (It is assumed that adverbs of quantification quantify over events (or states), that this particular partition of the sentence is determined by focus, and that the scope of the quantifier is interpreted as a set of events in a verification condition.) The second line is (together with the introduction of the set referent ζ) the result of Abstraction on that duplex condition. The third and fourth lines are the duplex condition constructed from the second sentence, before and after

resolution of the anaphoric set referent associated with the bare adverb of quantification. The fifth line is the result of substitution of the description of ζ for ζ in the restrictor, and the sixth line is the result of reduction in the restrictor and resolution of the pronoun in the scope made possible by that reduction.

The account of discourse subordination that suggests itself is based on two assumptions: First, a seemingly empty restrictor of a (determiner or adverb) quantifier over, say, u typically contains the condition $u \in U$ where U is anaphoric (and nonempty restrictors can contain this condition). Second, a generalization of Kamp's & Reyle's rule CR.DA, like: (i) Any set referent Z occurring in a condition can be replaced by $\Sigma z:\langle\ldots\rangle$ given a condition of the form $Z = \Sigma z$ $:\langle\ldots\rangle$; (ii) any condition $u \in \Sigma z:\langle\ldots\rangle$ can be reduced so that u replaces z and $\langle\ldots\rangle$ is merged with the structure where the condition occurs.

Such an account predicts that discourse subordination[5] is only possible when there is a quantifier licensing a condition $u \in U$ and this anaphoric U has an antecedent Z acting as a constant: $Z = \Sigma z:\langle\ldots\rangle$. This means that both the 'superordinate' and the 'subordinate' clause (corresponding to the first and second sentences in the discourses considered) must have a quantifier structure, though not necessarily a tripartite one; cardinality quantifier structures provide both a proper antecedent and a proper environment for a $\in$ condition. The relevant quantifier in either clause may be that of distribution, cf. (4) and (14). And, a $\in$ condition can be licensed by a singular NP (although not strictly a quantifier) in its specific sense, cf. (19), as by an adverb like "once", cf. (20).

(19) Every director gave a present to a child from the orphanage.
     One boy opened it right away.
(20) Harvey courts a girl at every convention. Once she came to the banquet with him.

As for modal subordination proper, cf. (17), where the quantifier quantifies over possible worlds, world and world set referents are required, the latter representing propositions, in such a way that the set of worlds such that a thief breaks in can be added to the conversational background for the zero antecedent counterfactual operator "would".

4.2 Telescoping and Conditionals

Thus an account of discourse subordination in terms of set anaphora and set reduction provides an explanation for Roberts' (1989: 717) descriptive generalization that "in each case, the second sentence in a discourse is interpreted as involving an operator (explicit or implicit) . . . ". There must be something in the second sentence to license a $\in$ condition. In particular, it is predicted that so–called 'telescoping', where a simple sentence is somehow understood as involving an implicit universal quantifier, is in principle constrained. The nature of the constraints is not well understood, but it seems that the sentence in question must describe a man–made rule and not just an accidental generalization:

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[5]in the loose sense of material including the antecedent of a pronoun being borrowed from a prior representation

(21)   Harvey courts a girl at every convention.
    a.   He takes her to the banquet.
    b. ? She comes to the banquet with him.

Now implicit universal quantifiers are unproblematic in connection with conditionals. It is commonly assumed that an "if" clause serves to restrict some quantifier in the main clause, and when this quantifier is not overt, it is by default universal ('always' or 'must'). Thus (21)c. is in order, where the abstracted information from the first sentence is merged with the representation of the "if" clause, supplying the pronoun with an antecedent.

(21) c.   Harvey courts a girl at every convention.
           If she's from Iowa, she comes to the banquet with him.

4.3   Subordination without Abstraction

Sometimes the antecedent for the set anaphor in a restrictor is a set formed from the restrictor, not the merge of the restrictor and the nuclear scope, of a given quantificational structure. This is particularly evident in cases of narrow, contrastive focus, like[6]:

(22) a.   Mary usually drives a RED car. But sometimes it is blue.

Informally, the antecedent for the pronoun in the second clause is not the red car Mary drives but just the car Mary drives. Note the oddity of the version where the noun "car" in the first clause is not deaccented:

    b. ? Mary usually drives a RED CAR. But sometimes it is blue.

On standard assumptions about focus and semantic partition, in a. the restrictor for "usually" is 'Mary drives a car', whereas in b. it is just 'Mary drives' (or, depending on context, 'Mary goes to work' or the like). Evidently, in a. the restrictor supplied for "sometimes" is *not* the result of Abstraction on the restrictor and scope from the first clause, but just the restrictor from the first clause. It seems that with a monotone decreasing quantifier like "rarely", there is a strong tendency not to use Abstraction, cf. (23)a. and b., but also that this tendency can be overridden in the presence of a suitable discourse relation, such as Explanation; cf. (23)c.

(23) a. ? Mary rarely bets on a harness horse. It is always an outsider.
    b.   Mary rarely bets on a harness horse. If she does,
          it is always an outsider.
    c.   Mary rarely bets on a harness horse. It always gallops.

5   Subordination versus Accommodation

Roberts (1989) described discourse subordination as a form of accommodation, largely induced by pronouns in the subordinate sentence in need of antecedents.

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[6]this phenomenon was brought to my attention by David Beaver

On this view, subordination is a special case of the more general phenomenon characterized by Partee (1993) thus: "some non–overt material appears to be "accommodated into" the restrictor clause, typically by virtue of being presupposed by something in the nuclear scope". However, on the view of anaphora as presuppositions (van der Sandt 1992), accommodation of a pronoun is considered to consist in the creation of a novel referent and to be practically impossible because pronouns have next to no descriptive content. And in fact, on the account outlined, discourse subordination does not appear as a repair strategy but as a regular form of context–dependency, composed of independently motivated mechanisms: Set anaphora, set abstraction, set description, and set reduction. The term accommodation ought to be reserved for those cases where what is 'filled into' the restrictor is predictable from the scope context–independently, as in (24), where the restrictor is the presupposition of the scope.

(24)   Hans always answers the phone.

Berman (1991) proposed that the presuppositions of the nuclear scope are accommodated into the restrictor, and if, as considered by Rooth (this volume), the focus constraint is interpreted as an existential presupposition on a par with clefts, cf. (25)a. and b., semantic partition by association with presupposition and by association with focus can be predicted as instances of the general mechanism of intermediate accommodation in the sense of van der Sandt (1992).

(25) a. Mary always takes JOHN to the movies.
      b. It is always John that Mary takes to the movies.

However, it has been argued by von Fintel (1994) (and, with regard to focus and nominal quantifiers (cf. Eckardt (this volume)), by de Hoop and Solà (1995) and Büring (this volume)) that focus or presupposition does not affect quantification directly but only indirectly insofar as both the former and the quantifier depend on a discourse antecedent. Similar ideas are pursued by Roberts (1995). On this view, (non–syntactical) restrictive clause formation is invariably a case of discourse linking. Many cases will involve subordination, in the sense that the discourse antecedent is apparently inaccessible, calling for some process of Abstraction.

Summing up, it has been shown that the machinery developed by K&R to give a complete description of plural anaphora can by way of the Enç notion of specificity be generalized to give a precise description of how, in Roberts' terms, material including antecedents for pronouns is borrowed from prior representations. Such a generalization provides a broader motivation for the special distribution rule of K&R and at the same time explicates discourse subordination as a formal procedure. However, it may be felt that the description is overly explicit. It is a central tenet in DRT that any anaphor should be supplied with an accessible antecedent, and if this is upheld, the proposed account is on the right track. But there may be reasons of a more general nature for preferring a less representational approach, maybe along the lines drawn up by Heim (1990). And in fact, there may well be data which after all cannot be handled by the machinery invoked in this paper, like (26), which does not seem to pose a corresponding problem for an 'E–type' approach.

(26)   Most books contain a table of contents.
        In 'War and Peace', it is at the end.

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