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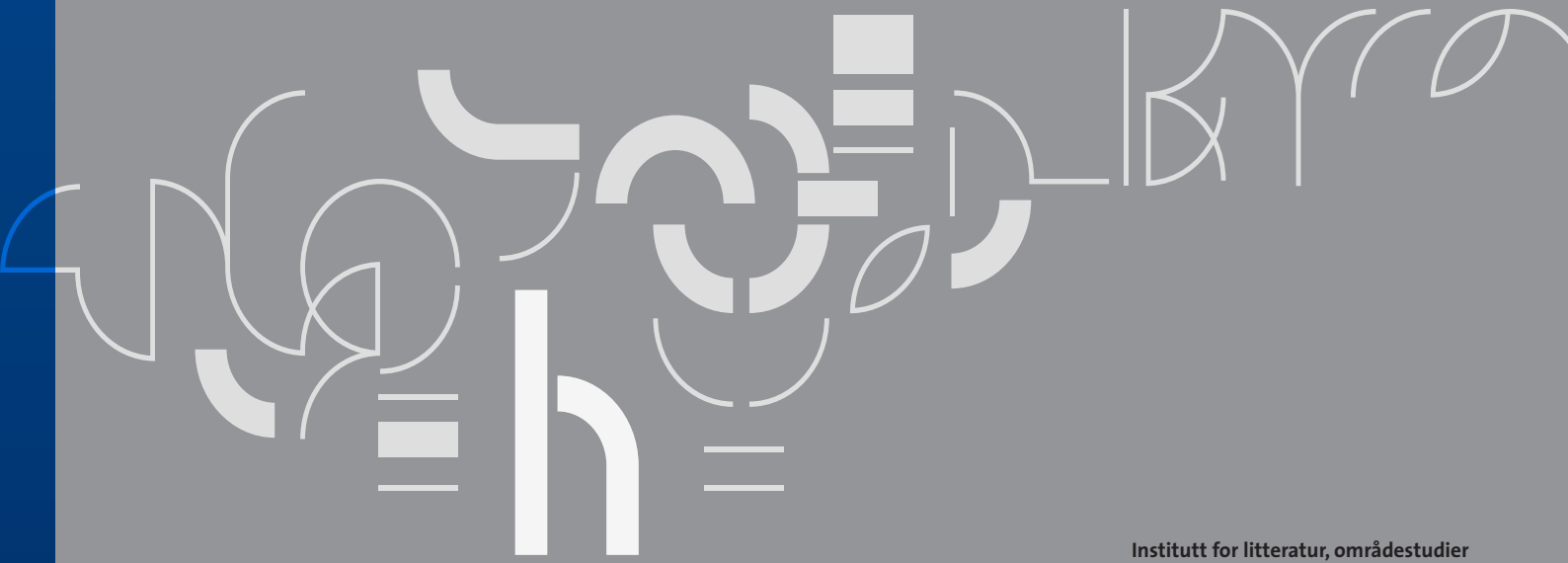

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Particles, Modality and Coherence*

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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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