

Copyright

by

Eric Scott McCready Jr.

2005

The Dissertation Committee for Eric Scott McCready Jr.  
certifies that this is the approved version of the following dissertation:

## The Dynamics of Particles

Committee:

---

Nicholas Asher, Supervisor

---

Rajesh Bhatt

---

Toshiyuki Ogihara

---

Bernhard Schwarz

---

Carlota Smith

# **The Dynamics of Particles**

by

**Eric Scott McCready Jr., B.A., M.A.**

## **Dissertation**

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

**Doctor of Philosophy**

**The University of Texas at Austin**

May 2005

To my family

# Acknowledgments

The biggest thanks must go to my supervisor, Nicholas Asher. I first took one of his seminars in my first year, after taking one semantics course. In his seminar, my horizons were suddenly broadened: dynamic logic, presupposition, belief revision, etc, etc. I didn't understand much but I had a great time. I had already been converted to semantics by that point, but in the seminar I realized that it was for me. Nicholas has helped me in more ways than I can name in the four years since then; with analysis, by getting excited by the new problems I brought to him, by generally being an inspiration. His knowledge of the literature and formal expertise is amazing. I can only hope that I will reach that point someday.

Thanks also to the other members of my committee. Rajesh Bhatt taught me my first semantics class; if not for him, I would probably be doing anthropological linguistics right now, which I can't even imagine. It was also inspiring to watch him be a great linguist and at the same time just be a cool guy. My interest in the empirical side of linguistics I owe in part to Bernhard Schwarz. He always has his finger on the data, and it always takes precedence over the formalism for him. I hope I have acquired this trait from him to some degree. Carlota Smith helped me a great deal in understanding how to evaluate papers given a vast literature, particularly when discussing the progressive in her Aspect seminar in Spring 2002. Toshiyuki Ogihara has also been an inspiration. Finally I should thank Junko Shimoyama, who, although not officially a committee member, I believe eventually got sick of

the sight of me in her office asking for yet another judgement, insight, or intuition.

Thanks are due to all those people who have given me comments, encouragement, and new ideas related to this work. I'm sure I can't remember everyone, but I would like to thank at least David Ahn, Pranav Anand, Chris Barker, David Beaver, Cleo Condoravdi, Yurie Hara, Hajime Hoji, Elsi Kaiser, Stefan Kaufmann, Kimiko Nakanishi, Andrew Nevins, Norihiro Ogata, Chris Potts, Ken-ichiro Shirai, Muffy Siegel, and Ayumi Ueyama. Thanks also to my fellow students at UT—too many names to name, but especially Garrett Heifrin, Hitoshi Horiuchi, Fred Hoyt, Alexis Palmer, Henrietta Yang and the semantics posse—Pascal Denis, Brian Reese, Linton Wang, and Madison Williams; thanks especially to Pascal Denis, Brian Reese and Linton Wang for extensive discussions and to Eriko Atagi, Hitoshi Horiuchi, Makiko Irie and Tomoko Sakuma for help with judgements. Thanks also to the others who made my time during the dissertation writing stage interesting and/or nice: Koji-kun, Takuji Okuno, Minoru Oshima, Chris Sanders, Sarah Stone, Yoko Tanaka, Makiko Ushijima, Luke White, Miki Yoshikawa, and everyone else. Thanks also to London, Puerto Rico, Jamaica and S.A. for a nice soundtrack to write to.

Most thanks of all go of course to my family: my parents: Eliza and John Morehead and Eric McCready Sr; and my brothers and sisters: Alex McCready, Lucian and Courtney Morehead, Katy and Matthew Manninen. Biggest thanks as always to my wife Midori Morita, and the kids, Kai and Colin. I couldn't and wouldn't have done it without you.

ERIC SCOTT MCCREADY JR.

*The University of Texas at Austin*  
*May 2005*

# The Dynamics of Particles

Publication No. \_\_\_\_\_

Eric Scott McCready Jr., Ph.D.

The University of Texas at Austin, 2005

Supervisor: Nicholas Asher

This dissertation examines several issues at the semantics-pragmatics interface in Japanese and English: modal subordination, particles and adverbials. Chapter 2 presents the framework that will be used throughout, and applies it to English modal subordination. In Chapter 3, the realization of modal subordination is shown to be quite different in Japanese than in European languages; in particular, the construction of discourse structure plays a much greater role. This chapter discusses the semantics of the Japanese modals and the realization of evidentiality within them.

Modal subordination in Japanese can be licensed by certain discourse particles. In Chapter 4, I turn to these particles, showing that the dynamic system developed in Chapter 1 can be extended to their analysis, although extensions involving deontic modality, underspecification and revision of information states are required. After making the necessary extensions, a semantics is formulated that accounts not only for the particles' ability to license modal subordination but also for other aspects of their meaning that have been noted in the literature: insistence, restriction to new information, and others.

Chapter 5 continues the discussion of particles, concentrating on English *man*. *Man* exhibits quite different properties when it appears sentence-initially and sentence-finally; sentence-final *man* is semantically much like the Japanese *yo*, even licensing modal subordination in certain contexts. Sentence-initial particles and expletives are shown to exhibit semantic restrictions on their distribution and also clear truth-conditional effects on the sentences they appear in. Their interpretation is shown to depend a great deal on intonational factors in two senses. The semantics of degree constructions are also shown to be affected by the particles in certain circumstances.

Chapter 6, the final chapter, steps away from particles to consider several complex adverbials in Japanese, each of which has an emotive component to its meaning. First, a pair of related adverbials, *yoku* and *yokumo*, are considered; they exhibit clear interactions with interpreter knowledge and the common ground. The final part of the dissertation turns to another adverbial, *sekkaku*, which is very context-dependent in that certain aspects of its meaning depend on world knowledge.



# Table of Contents

<b>Acknowledgments</b>	<b>v</b>
<b>Abstract</b>	<b>vii</b>
<b>Chapter 1 Introduction</b>	<b>1</b>
1.1 Dynamic Semantics . . . . .	5
1.1.1 Background: Basic DRT . . . . .	5
1.1.2 DPL: the basics . . . . .	8
1.1.3 Background on SDRT . . . . .	12
<b>Chapter 2 Modal Subordination and Epistemic Modalities</b>	<b>17</b>
2.1 Previous Accounts . . . . .	24
2.2 Semantics . . . . .	27
2.2.1 Combining Distributive and Non-Distributive Intuitions . . . . .	27
2.2.2 Modal Subordination and Discourse Structure . . . . .	37
2.3 Summary . . . . .	41
<b>Chapter 3 Japanese Modality and Subordination</b>	<b>42</b>
3.1 Background on Japanese . . . . .	43
3.1.1 Tense and aspect in Japanese . . . . .	43
3.1.2 Japanese discourse particles . . . . .	43

3.1.3	Japanese nominal interpretation . . . . .	44
3.2	Modal Expressions in Japanese . . . . .	45
3.2.1	<i>Kamosirenai, nitigainai</i> and <i>hazu</i> . . . . .	48
3.2.2	Complications on counterfactuality . . . . .	51
3.3	Past treatments of evidentials: Faller 2002 . . . . .	53
3.4	Modal subordination in Japanese . . . . .	56
3.4.1	Discourse markers and conditionals . . . . .	59
3.4.2	Modal subordination with emphatics . . . . .	60
3.4.3	Excursus: Uniqueness and null pronouns . . . . .	63
3.5	Modal Semantics . . . . .	66
3.5.1	Modals and evidentiality . . . . .	67
3.5.2	Excursus: Quechua evidentials . . . . .	74
3.6	Explaining the facts . . . . .	76
3.6.1	Contrast 1: $\diamond\diamond$ and $\square\diamond$ . . . . .	76
3.6.2	$\diamond\square$ . . . . .	78
3.6.3	Contrast 2: No particle vs. discourse particle . . . . .	81
3.6.4	Background on Japanese conditionals . . . . .	88
3.6.5	Conditional dependence . . . . .	92
3.6.6	Some additional observations . . . . .	93
3.7	Comparison with other accounts of modal subordination . . . . .	95
3.7.1	Accommodation: Roberts (1989) . . . . .	96
3.7.2	Presupposition: Geurts (1999) . . . . .	105
3.7.3	Anaphora to contexts: Frank (1997) . . . . .	108
<b>Chapter 4 Particles and Information</b>		<b>113</b>
4.1	The big picture . . . . .	114
4.2	The <i>sirase</i> particles . . . . .	115
4.2.1	Yo . . . . .	115

4.2.2	Zo . . . . .	120
4.2.3	When are particles modal? . . . . .	123
4.3	<i>Yo</i> and <i>zo</i> : a proposal . . . . .	124
4.3.1	Excursus: bisimulations for anaphoric dependencies . . . . .	128
4.3.2	Semantics of <i>yo</i> and <i>zo</i> . . . . .	130
4.4	Modalization: when and how? . . . . .	135
4.4.1	Option 1: pragmatics . . . . .	137
4.4.2	Option 2: semantics . . . . .	138
4.4.3	Option 3: semantics/pragmatics . . . . .	139
4.4.4	An underspecified semantics for <i>yo</i> and <i>zo</i> . . . . .	142
4.5	A complication . . . . .	150
4.5.1	Null modals . . . . .	151
<b>Chapter 5 Emotives in English</b>		<b>153</b>
5.1	Semantic properties of sentence-final emotives . . . . .	153
5.1.1	Insistence . . . . .	155
5.1.2	Modal subordination, <i>man</i> . . . . .	156
5.1.3	Analyzing sentence-final <i>man</i> . . . . .	161
5.2	Sentence-initial <i>man</i> . . . . .	168
5.2.1	Sentence-initial <i>man</i> : distribution . . . . .	169
5.2.2	Meaning of sentence-initial <i>man</i> . . . . .	174
5.3	Expletives . . . . .	181
5.3.1	The meaning of expletives . . . . .	182
5.4	Analyzing the sentence-initial particles . . . . .	187
5.4.1	Tools: emotive meaning . . . . .	187
5.4.2	Meaning of epithets and <i>man</i> : emotion . . . . .	190
5.4.3	Meaning of epithets and <i>man</i> : intonation . . . . .	194
5.4.4	Meaning of epithets and <i>man</i> : degrees . . . . .	197

<b>Chapter 6</b>	<b>Discourse Particles and Japanese Adverbials</b>	<b>210</b>
6.1	<i>Yoku(mo)</i> . . . . .	211
6.1.1	Characterizing the meaning of <i>yoku(mo)</i> . . . . .	212
6.1.2	Particles and information states . . . . .	214
6.1.3	Denials . . . . .	217
6.1.4	Distribution of <i>yoku(mo)</i> . . . . .	224
6.1.5	Polarity switching . . . . .	234
6.1.6	Conclusions . . . . .	235
6.2	<i>Sekkaku</i> . . . . .	235
6.2.1	Meaning of <i>sekkaku</i> . . . . .	236
6.2.2	Denials . . . . .	242
6.2.3	Distribution of <i>sekkaku</i> . . . . .	244
6.2.4	Explaining antirootedness . . . . .	250
	<b>Bibliography</b>	<b>256</b>
	<b>Vita</b>	<b>268</b>

# Chapter 1

## Introduction

One can think of our knowledge of how language works as a map of a continent. In the past forty years, since Montague's work opened up the modern study of semantics and pragmatics, we have come to know a great deal about the part of this continent that pertains to meaning. But what we know is by no means exhaustive. The main goal of this dissertation is to chart a small part of the part of this terrain that lies on the semantics/pragmatics interface. This area has been the locus of a great deal of work in the past few years, particularly within dynamic semantics; but there are still zones which have been left alone. Dynamic semanticists in particular have concentrated on anaphora and presupposition; my hope is that the content of this dissertation shows that the techniques that have been developed within this body of work can be profitably applied to other domains.

Chapter 2 presents a new approach to the semantics of epistemic modals, with application to modal subordination. Previous approaches to modals include static two-place operator approaches (largely based on Kratzer 1981 and subsequent work) and the dynamic approaches of Veltman (1996) and Frank (1997). A tension can be identified between these last two approaches in terms of accounting for information change under modals, on the one hand, and modal subordination (i.e. anaphora

under modals), on the other. The chapter provides a new dynamic semantics for epistemic modals which integrates these two approaches. The approach is then applied to modal subordination.

Chapter 3 moves on to consider the case of Japanese. The empirical domain of nearly all studies on modals and modal subordination has been the European languages; English, German, and French (Corblin, 1994). Chapter 3 extends the domain of inquiry to Japanese, where the realization of modal subordination is quite different than in what previous researchers have showed to be the case for the European languages; in particular, the construction of discourse structure plays a much greater role. But there are preliminary steps that must be taken before modal subordination can be examined profitably. One must first understand the semantics of the Japanese modals before one can understand modal subordination; and, in turn, the Japanese modals exhibit an evidential component, so one must have some understanding of evidentiality. Finally I consider how existing accounts of modal subordination might be extended to the Japanese data, concluding that they do not generalize particularly well.

As it turns out, however, modal subordination in Japanese can be licensed by elements other than modals: certain discourse particles can also play this role, in particular *yo* and *zo*. In Chapter 4, I turn to these particles, showing that the dynamic system developed in Chapter 2 can be extended to their analysis, although extensions involving deontic modality, underspecification and revision of information states are required. After making the necessary extensions, I give a semantics for *yo* and *zo* that accounts not only for their ability to license modal subordination but also for other aspects of their meaning that have been noted in the literature: insistence, restriction to new information, and others. This domain is, to my knowledge, genuinely new to formal semantics; although there has been a good deal of recent research on the German modal particles (Kratzer, 1999; Zeevat, 2003;

Potts, 2005; Kaufmann, 2004b), formal semantics has up to the present ignored the Japanese facts. I hope to show that dynamic semantics is a useful tool in analyzing how these particles work, and so to help extend the empirical domain of dynamic semantics to a new area.

Chapter 5 continues the particulate theme; it is a consideration of some emotive particles in English, concentrating on the semantics of *man*. *Man* exhibits quite different properties when it appears sentence-initially and sentence-finally; sentence-final *man* is semantically much like the Japanese *yo*, even licensing modal subordination in certain contexts. I begin the chapter by using the techniques developed for the Japanese modals to bring out these parallels. I then move on to sentence-initial *man*, and the expletives, which are very different semantically from the sentence-final case. These particles have not, to my knowledge, been given analyses in formal semantics at all; whether this is because previous researchers have believed them not to have a semantics with sufficient content to study, or to exhibit concrete patterns of meaning at all, is unclear to me. Still, I show that they do have semantic restrictions on their distribution and also clear truth-conditional effects on the sentences they appear in. Their interpretation is shown to depend a great deal on intonational factors in two senses. First, certain intonational contours are associated with distinct meanings, and second, the interpretation of the particle is partly dependent on whether it forms an intonational unit with the sentence it attaches to (which I call *integrated* intonation) or does not (*independent* intonation). My analysis of these patterns does not rely crucially on the dynamic system I made use of in the two earlier chapters; still, it is compatible with this system, though also with others.

An interesting fact about the particles is that compositionality issues often arise in their analysis. This, as the reader will see, is the case for all of the particles I consider: *yo*, *zo*, *man*, and even the expletives. I make use of techniques

from the literature on dynamic semantics and underspecification, and, in particular, Segmented Discourse Representation Theory (SDRT; Asher and Lascarides 2003), in resolving these issues. I believe that one contribution of the dissertation is to show that dynamics and underspecification are useful, and perhaps even necessary, in achieving a compositional treatment of the particles.

Chapter 6, the final chapter, steps away from particles to consider several complex adverbials in Japanese, each of which has an emotive component to its meaning. I first consider a pair of related adverbials, *yoku* and *yokumo*, that exhibit clear interactions with interpreter knowledge and the common ground, which also means that dynamic notions are needed for their analysis. In addition, the restrictions present on the content of the common ground can be satisfied by the addition of the particle *na*, which therefore often appears with these adverbials; for this reason, I also give an analysis of this particle, which also requires dynamics. It is also shown that denying the content of a sentence modified by *yoku* or *yokumo* works in a way quite different than one might expect in that, for most speakers, the entire complex of content introduced by the adverbial cannot be denied simultaneously. I use techniques from SDRT to model the facts, showing again that these tools have uses beyond those originally intended by their inventors. The final part of the dissertation turns to another adverbial, *sekkaku*, which is quite as complex as the other two, but doesn't introduce complications based on denials. As I show, however, it is very context-dependent in that certain aspects of its meaning depend on world knowledge; it is necessary, again, to make use of dynamics here. Discourse structure also is shown to play some role in *sekkaku*'s meaning.

The remainder of this introductory chapter serves to introduce some theoretical background that is of use in understanding the development in later chapters.



## 1.1 Dynamic Semantics

Before going on to the meat of the thesis, I would like to first introduce briefly the basic notions of dynamic semantics. The discussion of anaphoric dependencies in this dissertation will focus on the case of modal subordination. Most of the research in this area has been carried out within the framework of Discourse Representation Theory (DRT; Kamp and Reyle 1993); for this reason, my discussion will also be situated within a variation of this framework, Segmented DRT (Asher and Lascarides, 2003), that incorporates a notion of discourse structure. DRT can be given a static semantics (Kamp and Reyle, 1993), or a dynamic one (Muskens, 1996); SDRT is formulated dynamically. This distinction does not play a role in the definition of anaphoric accessibility, however, which is essentially syntactic. I present the basic notions of DRT in the following subsection, following them with the ideas behind dynamic notions of semantics. The introductory part of this work closes with a discussion of SDRT.

### 1.1.1 Background: Basic DRT

It will be helpful to consider one account of intersentential binding of pronouns before exploring modal subordination in Japanese more deeply. The theory to be presented is Discourse Representation Theory (DRT; Kamp 1981; Kamp and Reyle 1993), as it is the framework assumed by most available accounts of modal subordination.

In DRT, each (informative) sentence in a discourse introduces *conditions* and possibly *discourse referents* into a Discourse Representation Structure (DRS). Discourse referents are similar to logical variables, and serve as markers for entities asserted to exist within the discourse. DRS-conditions hold of these referents, and can be of the forms standard in ordinary first-order logic. Recursively, where  $A, B$  are first-order formulas, possible DRS-conditions are  $A, \neg A, A \vee B, A \Rightarrow B$ . Thus, a DRS  $K$  can be represented set-theoretically as an ordered pair  $\langle U_K, C_K \rangle$ , where

$U_K$  is the set of discourse referents (the *universe* of the DRS) and  $C_K$  is the set of *conditions* that are predicated of the discourse referents. Standardly, however, DRSs are represented as boxes. For instance, the DRS for *A wolf walked in* would look like the following:

$$(1.1) \quad \boxed{\begin{array}{l} x \\ \textit{wolf}(x) \\ \textit{walked} - \textit{in}(x) \end{array}}$$

The same DRS in set-theoretic notation would be  $\langle \{x\}, \{\textit{wolf}(x), \textit{walked} - \textit{in}(x)\} \rangle$ . As the box notation is obviously easier to follow (especially as DRSs become complex), I will use it throughout the paper.

For a DRS to be true, there must be an *embedding* from it into a first-order model, a function that maps each discourse referent to an entity in the model such that each condition which is predicated of the discourse referent holds of the corresponding entity in the model as well. This simply means that the entity in the model must be a member of the set which is the denotation of the predicate (and similarly for predicates of arity greater than 1). Assertion of existence thus holds at the level of the embedding rather than being explicitly stated within the DRS. For complex conditions,  $\vee$  acts precisely as one would expect: an embedding must exist for one of the two elements conjoined by  $\vee$ .<sup>1</sup>

The case of  $A \Rightarrow B$  is slightly more complex. Here the semantics states that for every embedding that verifies the main DRS, every *extension* of it verifying  $A$  must be further extendable to an embedding verifying  $B$ . The definition of *extension* has two parts. First, it must have the same universe as the original embedding function, possibly augmented with additional referents introduced in  $A$  ( $B$  in the second update). Second, it must verify all the conditions verified by the original function and also verify those in  $A$  ( $B$ ). An example will help clarify. Here is the

---

<sup>1</sup>Since disjunction is not exclusive in DRT, an embedding may also exist for both elements, of course.

DRS for *If a farmer owns a donkey, he beats it*:

$$(1.2) \quad \boxed{\begin{array}{l} x, y \\ \text{farmer}(x) \\ \text{donkey}(y) \end{array}} \Rightarrow \boxed{\text{beat}(x, y)}$$

Note that the sentence *Every farmer who owns a donkey beats it* introduces precisely the same DRS condition, as in DRT universal quantification is given the same treatment as conditional sentences. Here the main DRS is empty, so it imposes no conditions on the embedding. Thus any embedding will be an extension of the original embedding. The first extension must map referents  $x$  and  $y$  to entities in the model that are members of the denotation of *farmer* and *donkey* respectively. For each pair of entities selected by the first embedding, the second extension must locate them in the denotation of *beat*. This gives the weak reading for the conditional (universal), in which at least one beating must take place in each farmer-donkey pair. It's possible to derive the strong reading in DRT as well (see Kamp and Reyle (1993) for details).

Crucially, in DRT anaphoric accessibility is constrained through an *accessibility relation*. (Kamp and Reyle, 1993, p.154-155) define this relation using a relation of *subordination*, defined as follows:

- (1.3) a.  $K_1$  is *immediately subordinate* to  $K_2$  iff either
- a.  $C_{K_2}$  contains the condition  $\neg K_1$ ; or
  - b.  $C_{K_2}$  contains a condition of the form  $K_1 \Rightarrow K_3$  or one of the form  $K_3 \Rightarrow K_1$  for some DRS  $K_3$
- c.  $K_1$  is *subordinate* to  $K_2$  iff either
- a.  $K_1$  is immediately subordinate to  $K_2$ ; or
  - b. there is a  $K_3$  such that  $K_3$  is subordinate to  $K_2$  and  $K_1$  is immediately subordinate to  $K_3$ .

- c.  $K_1$  is *weakly subordinate* to  $K_2$  iff either  $K_1 = K_2$  or  $K_1$  is subordinate to  $K_2$ .

A referent  $x \in U_K$  is accessible to another referent  $y \in U_{K'}$  in a DRS iff  $K'$  is weakly subordinate to  $K$  or to some other DRS that's weakly subordinate to  $K$ . Effectively, the notion of weak subordination is defined so that a DRS 'higher' in terms of embedding weakly dominates those 'lower' than it, and a DRS interpreted before another weakly dominates it; this is the conditional case. Subordination controls the accessibility of discourse referents for anaphoric pronouns. The upshot of the preceding definition is that, when looking for an antecedent, an anaphoric pronoun can look *up and left* but not *right* or *down*.

This formulation makes the right predictions for negation (1.4), conditionals (1.5) and universally quantified sentences (1.6), as it was designed to do. In each of the following discourses, the infelicitous (a) sentences involve looking 'down' into a subordinate DRS or 'right' into a conditional consequent, while in the (b) sentences the 'left and up' program is followed.

(1.4) a. Bill didn't see a dog. # It was hungry.

b. Bill saw a dog. It wasn't hungry.

(1.5) a. # If John bought it, this is a car.

b. If John bought a car, this is it.

(1.6) a. Every professor owns a book on semantics. # It is bizarre. Kamp and Reyle (1993)

b. Bill owns a book on semantics. Every student read it.

### 1.1.2 DPL: the basics

Here I would like to present the basic intuitions behind some other versions of dynamic semantics, some examples that support them, and some of the terminology

I will make use of throughout the dissertation, where these other theories will be discussed and made use of further. The essential idea of truth-conditional semantics is, as its name suggests, that the meaning of a sentence can be reduced to its truth-conditions. Dynamic semantics rejects this notion and starts with a different intuition: that the meaning of a sentence is the change it makes in the information of an interpreter who accepts its content. There are philosophical reasons for this choice—for instance, a particular agent can be moved to act on the basis of processing a sentence, which seems more likely to be the result of a change in her mental state than of the passive recognition of a sentence’s truth conditions—but there are also empirical ones. I will briefly discuss two examples. The first is from Veltman (1996).

- (1.7) a. It might be raining . . . It’s not raining.  
b. # It’s not raining . . . It might be raining.

Assume that the same individual processes each of these sentences, at more or less the same time. Then the first pair is sensible; the speaker might have looked out the window and seen that it is, in fact, quite nice outside, which the interpreter may accept. The second, though, is not, assuming no change of heart on the part of the speaker, for there is no way for the interpreter to ‘readmit’ the possibility of rain after it has been definitively ruled out. For Veltman, examples like these show that epistemic *might* has a particular character; it *tests* the information state of an interpreter; if it is possible to *update* the information state with the proposition in the scope of the modal, then a sentence of the form *might* $\varphi$  can be processed successfully. Conversely, the function of sentential negation is to filter out all parts of the information state that allow update with the proposition under the negation. After such an update, an attempt to process *might* $\varphi$  will fail; negation will already have removed those states that *support* update with  $\varphi$ , making sequences like that in (1.7b) infelicitous. It is not clear that truth-conditional semantics has much to

say about contrasts of this sort.

An example of a different kind involves the possibility of anaphora. The following pair is due to Barbara Partee.

- (1.8) a. One of the ten marbles is not in the bag. It is under the sofa.  
b. # Nine of the ten marbles are in the bag. It is under the sofa.

Both (1.8a) and (1.8b) have the same truth-conditions: there must be nine marbles in the bag, and one not. However, only the first sentence supports a continuation with anaphoric *it*. The difference clearly comes from the form of the sentences: (1.8a) contains an NP of the form [*one N*] which can serve as antecedent for *it*, while (1.8b) does not. But these differences are clearly not truth-conditional. The solution, according to dynamic semantics, lies in the effect the sentences have on the information state of an interpreter: the first introduces a discourse referent, while the second does not.

To show how these ideas are implemented in formal systems, let me now briefly introduce one version of dynamic semantics, Dynamic Predicate Logic (DPL; Groenendijk and Stokhof 1991). DPL has the same syntax as ordinary first-order logic (predicate logic), but a different semantics based on first-order dynamic logic, which was originally developed to model the semantics of programs. Programs can also be thought of as operations on states; they take an initial state, and, after the program is run, output a possibly changed (updated) version of that initial state. Groenendijk & Stokhof's innovation was to adopt the idea that sentences of natural language also have the capacity to change information states, just in case their logical form includes an existential quantifier. If an existential quantifier is present, a new 'discourse referent' is added to the stock of objects that the interpreter knows exist.<sup>2</sup> Formulas without existential quantifiers act as *tests*; they simply check the

---

<sup>2</sup>This notion of discourse referent is somewhat distinct from that used in DRT; I will not worry about these subtleties here.

input state to see whether it verifies the content of the formula already. If it does, the initial state is identical to the output state; if it does not, the operation fails. Models for DPL are pairs of sets of individuals and assignment functions. A failed test of e.g. the formula  $P(a)$  corresponds to the case where the input assignment does not assign the individual denoted by  $a$  to the extension of the predicate  $P$ . Here is the basic semantics of DPL formulas (I omit the clauses for the conditional, disjunction, and the universal quantifier, since they can be defined from the others in the usual way).

**Semantics of DPL Formulas.**

- $\llbracket R(x_1, \dots, x_n) \rrbracket = \{ \langle g, h \rangle \mid h = g \wedge \langle \llbracket t_1 \rrbracket, \dots, \llbracket t_n \rrbracket \rangle \in F(R) \}$
- $\llbracket \neg\varphi \rrbracket = \{ \langle g, h \rangle \mid h = g \wedge \neg\exists k : \langle h, k \rangle \in \llbracket \varphi \rrbracket \}$
- $\llbracket \varphi \wedge \psi \rrbracket = \{ \langle g, h \rangle \mid \exists k : \langle g, k \rangle \in \llbracket \varphi \rrbracket \wedge \langle k, h \rangle \in \llbracket \psi \rrbracket \}$
- $\llbracket \exists x\varphi \rrbracket = \{ \langle g, h \rangle \mid \exists k : k[x]g \wedge \langle k, h \rangle \in \llbracket \varphi \rrbracket \}$

The crucial point here is the definition of the existential quantifier. The idea is that each use of an existential quantifier defines a new individual for the output assignment function; since it is just this assignment function that serves as input for each formula that follows it, the existential quantifier effectively becomes able to bind variables (pronouns) throughout the rest of whatever text is being parsed.

How does this semantics account for anaphora facts? The Partee example above, for instance, does not contain any existential quantifier corresponding to the missing marble, but only an existential quantifier over groups with cardinality 9.<sup>3</sup> Therefore there is no part of the assignment function that can bind the pronoun that follows.

---

<sup>3</sup>This statement glosses over many controversies and complexities in the interpretation of plurals. I do not mean to take any position on the right semantics for plurals here; the implicit statement that ‘plurals are sets’ is made strictly for expository convenience.

### 1.1.3 Background on SDRT

Now I wish to introduce the semantic framework that will be used throughout the dissertation for various purposes, SDRT. It is well known that discourses are not unstructured sequences of propositions, but have complex structures of their own (cf. Mann and Thompson 1986; Lascarides and Asher 1993; Webber et al. 2001; discourse segments (generally sentences or clauses) can be connected by various discourse relations. Recent work in Segmented Discourse Representation Theory (SDRT; Asher and Lascarides 2003) claims that discourse relations can be separated into two basic types, coordinating and subordinating relations. This distinction was originally motivated by facts about anaphoric accessibility that standard DRT was unable to handle. In a moment we'll look briefly at a concrete example.

In SDRT, each discourse segment is treated as a speech act which introduces a label that marks its propositional content, of the form  $\pi_n$ . Through a complex reasoning process involving nonmonotonic inference over discourse content, lexical information and world knowledge, binary discourse relations are inferred as holding between these labelled speech acts; these relations take the form  $R(\pi_1, \pi_2, \pi)$ , where  $\pi_1$  and  $\pi_2$  label the speech acts to be connected by  $R$ , and  $\pi$  indicates the attachment point in the discourse structure. Inference is done in a nonmonotonic glue logic using axioms like that in (1.9). Here  $\alpha$  and  $\beta$  are the events described by  $\pi_1$  and  $\pi_2$  and  $occasion(\alpha, \beta)$  holds if there is a natural sequence of events where  $\alpha$ -type events lead to  $\beta$ -type events. We will have reason to revisit this predicate in a later chapter, where I will also revise its semantics somewhat. Note also that this is only a two-place predicate; the reason is that it is a predicate in the description language, unlike the discourse relations. Rather, it marks certain kinds of information holding within  $\alpha$  and  $\beta$  themselves.  $>$  is a nonmonotonic conditional;  $\varphi > \psi$  has the intuitive meaning 'if  $\varphi$ , then normally  $\psi$ '. I refer the reader to Asher and Morreau (1991) for details of its semantics.



(1.9) **Narration:**  $(?(\alpha, \beta, \gamma) \wedge occasion(\alpha, \beta)) > Narration(\alpha, \beta, \gamma)$

This axiom states that if  $\alpha$  occasions  $\beta$ , then ordinarily the relation *Narration* is inferred between the two. More specifically, it will be inferred in the absence of contrary information, since  $>$  is nonmonotonic; for instance, the presence of monotonic information (‘hard’ information) about discourse structure will serve to override the inference of *Narration* here. To give a concrete example, consider (1.10).

(1.10) John fell. Bill helped him up. (Asher and Lascarides, 2003)

The axiom on world knowledge in (1.11) will serve to allow the inference of *occasion* for the two speech acts introduced by the sentences in (1.10), resulting, with an instance of (1.9), in the discourse relation *Narration* holding between the two constituents.

(1.11)  $(?(\alpha, \beta, \gamma) \wedge [fall(e_1, x)](\alpha) \wedge [help\_up(e_2, y, x)](\beta)) > occasion(\alpha, \beta)$

However, in SDRT, discourse particles like *because* are assumed to introduce monotonic information about discourse relations; in the case of *because*, the relation *Explanation*. Thus, despite the fact that the information in (1.10) combined with the axioms in (1.9) and (1.11) supports the inference of *Narration* between the two sentences in (1.10), the monotonic information from the particle will block the inference in (1.12). Instead, the discourse relation *Explanation* will be inferred to hold between the two sentences (which, presumably, is the reason for its oddity; the interpreter must work quite hard to find an interpretation for the discourse on which John’s falling can be the result of Bill’s helping him up).

(1.12)? John fell down. Because Bill helped him up.

(1.13) shows the SDRT axiom for *Elaboration*, which intuitively holds between two constituents when one provides further information about the other. In

this axiom,  $Top(\sigma, \alpha)$  indicates that  $\sigma$  dominates  $\alpha$  and is undominated (i.e. it is at the top of the graph resulting from the discourse structure);  $subtype_D(\sigma, \beta, \alpha)$  states that, according to information introduced elsewhere in the discourse, the event described by  $\beta$  is a subtype of the event described by  $\alpha$ ; and  $Aspect(\alpha, \beta)$  is a schema into which any aspectual type can be substituted, which ensures that aspectual information does not get in the way of the inference.

$$(1.13)\text{Elaboration: } (?(\alpha, \beta, \gamma) \wedge Top(\sigma, \alpha) \wedge subtype_D(\sigma, \beta, \alpha) \wedge Aspect(\alpha, \beta)) > \\ Elaboration(\alpha, \beta, \gamma)$$

I will give a concrete example making use of these axioms, and showing how the resulting graph constrains anaphoric dependencies, shortly.

The structure that results from series of inferences like these is an acyclic graph which puts important constraints on anaphora: informally stated, for an anaphoric expression introduced in a given discourse segment  $K$ , only discourse referents introduced in segments which are connected to  $K$  by some (sequence of) discourse relations are available. Importantly, once a segment is attached to a node  $i$  in the discourse structure using a coordinating relation, nodes subordinate to  $i$  are no longer available for attachment. This definition has important consequences for anaphora. Coordinating relations can be understood as relating two speech act labels on the same level of a hierarchical graph, while subordinating relations introduce dependent nodes. Thus, discourse referents introduced by a speech act  $K$  connected to  $K'$  by a subordinating relation becomes unavailable for anaphoric expressions in a discourse segment  $K''$  which is attached to  $K'$  by a coordinating relation.

Let us now consider the concrete example promised a moment ago.

- (1.14)a. John had a wonderful evening last night. ( $\pi_1$ )  
 b. He had a great dinner. ( $\pi_2$ )

- c. He ate salmon. ( $\pi_3$ )
- d. He had a nice cheese. ( $\pi_4$ )
- e. Then he won a dancing competition. ( $\pi_5$ )
- f. ?It was a beautiful pink. ( $\pi_6$ )

DRT predicts that the discourse referent introduced by *salmon* in (1.14c) is accessible to the pronoun in (1.14e), since it is not in the scope of any operator. This prediction is clearly not correct. In SDRT, *Elaboration* is a subordinating relation inferred when one segment gives more detail on the information provided by a preceding one: thus we infer  $Elaboration(\pi_1, \pi_2)$ ,  $Elaboration(\pi_2, \pi_3)$ ,  $Elaboration(\pi_2, \pi_4)$ , and  $Elaboration(\pi_1, \pi_5)$ . The presence of the discourse marker *then* induces a monotonic inference of  $Narration(?, \pi_5)$ ; world and lexical knowledge allow resolution of ? to  $\pi_2$ . The result of these computations is shown in the graph in (1.15). *Narration* is a coordinating relation, and so ‘closes off’ the possibility of attaching  $\pi_6$  to  $\pi_3$ , as would be needed to resolve *it* to the referent introduced by *salmon*. The result is that the discourse is incoherent.



We see now that the subordinating-coordinating distinction has crucial effects on anaphora; I will show in chapter 6 that it also plays a role in the interpretation of non-truthconditional elements of discourse. In what follows, I will make use of DPL-style logical forms and also SDRT structures (SDRSs). Lascarides and Asher (1993) and Asher and Lascarides (2001) already show that the speech-act aspect of discourse relations has uses beyond simple descriptions of anaphoric accessibility;

this later chapter shows that they can also be used to characterize (at least some aspects of) expressive content.

## Chapter 2

# Modal Subordination and Epistemic Modalities

Over the past twenty years, there have been numerous discoveries and theoretical proposals for modals in Romance and Germanic languages, as well as for conditionals and counterfactuals. But there has been little attempt to produce a compositional account of counterfactuals from an account of the meanings for the conditional and the modals.<sup>1</sup> Here I present a detailed, dynamic semantics for modals that leads to a new semantics for counterfactuals. This semantics will be used throughout the remainder of the dissertation (although the discussion in the final two chapters is largely independent of it).

For the modals *might* and *would*, there are two important sets of observations that pull any putative account of these constructions in different directions. Veltman's (1996) seminal paper on epistemic modals introduces the idea that epistemic possibilities conveyed with a modal like *might* interact dynamically with factual information introduced in a discourse. Factual information introduced into a dis-

---

<sup>1</sup>A prominent exception to this generalization is Gillies (2004) who makes a good start on such a project, but there remains a lot of work to be done.

course may rule out certain epistemic possibilities that might otherwise be present. Consider again the following minimal pair, first discussed in chapter 1.

- (2.1) a. It might be sunny. It's not sunny.  
b. #It is not sunny. It might be sunny.

Veltman's examples show that epistemic possibilities are subject to what information has already been introduced in the discourse; once it has been established in the discourse that it is not sunny, it is no longer permissible to introduce the epistemic possibility that it might be sunny, as in (2.1b). If you think of *mightp* as ambiguous between the epistemic reading that says "for all that is known given the discourse so far, it's possible that *p*" and the metaphysical reading, (2.1b) only has a marginal metaphysical reading, whereas (2.1a) has both readings felicitously.<sup>2</sup> Further, while some have claimed that (2.1b) has a reading according to which the speaker revises his contribution, I claim that revisions need much more linguistic marking than is possible in (2.1 b). Like Veltman, I believe that (2.1b) remains very marginal even when one has the revision scenario in mind. Introducing as an epistemic possibility something that has already been established in the discourse as in (2.1c) is also infelicitous, though less so than (2.1b).

(2.1c)? It is sunny. It might be sunny.

This observation has largely been accounted for on pragmatic grounds: since *p* entails *mightp*, the assertion of *mightp* after an assertion of *p* conveys no new information and so violates the Gricean maxim that a speaker's contributions should be at least minimally informative.

The phenomenon that creates difficulties for this account is modal subordination. Nonspecific indefinites introduced within the scope of a semantic operator such

---

<sup>2</sup>I find that the metaphysical reading is much better for the following variant of (2.1b): *It is not sunny. But it might have been sunny.*

as negation or a modal are generally not available for coreference with anaphoric expressions in subsequent sentences (cf. (2.2a,2.3a)). These facts have been well-known in formal linguistics since at least the early 1970s, when they were pointed out by Karttunen (1976). In that paper, Karttunen also showed that a class of counterexamples exists to the above generalization. In discourses when subsequent sentences also contain semantic operators compatible with the first, coreference can occur (2.2b,2.3b):<sup>3</sup>

(2.2) a. A wolf might come in. # It is hungry. (Roberts 1989)

b. A wolf might come in. It would eat you first.

(2.3) a. A thief might break in. # He will take the silver. (Roberts 1989)

b. A thief might break in. He would take the silver

Roberts (1987) dubbed this phenomenon *modal subordination*, after the intuition that the second sentences of discourses like the above is interpreted in a context 'subordinated' to that introduced by the first semantic operator; that is, the operator is able to take scope over the second sentence. Indeed, Karttunen states that discourses like (2.2b) have the following general logical form, in which the first sentence functions as the restrictor of a conditional clause that has the entire remaining discourse as its consequent:

(2.4) IF  $S_0$  THEN  $S_1, S_2, S_3 \dots$

Some more examples of modal subordination are shown in (2.5).<sup>4</sup>

---

<sup>3</sup>Some scholars take examples where an indefinite is introduced in the scope of negation like that below to also constitute instances of modal subordination.

- Mary didn't buy a microwave. # It is white. (Frank, 1997)
- Mary didn't buy a microwave. She wouldn't know what to do with it.

I will not consider examples like these in this dissertation in detail, as they lie on the fringes of the modal subordination issue. See however section 2.2.2 for some discussion.

<sup>4</sup>These examples are from Asher and McCreedy (2004).

- (2.5) a. A wolf might walk in. It would eat you first.  
 b. A wolf might walk in. # It will eat you first.  
 c. A wolf must surely/ should walk in. It might eat you first

There is a striking difference between (2.5a) and (2.5b). In (2.5a) the use of the epistemic modal *would* enables the pronoun *it* to find its intended antecedent, the wolf introduced under the scope of the modal in the first sentence. (2.5c) shows that the modal *might* has the same effect as *would* in enabling the accessibility of the intended antecedent. Nevertheless, since *a wolf* occurs under the scope of the modal operator in that sentence, it is unavailable as an antecedent for the pronoun in nonmodal contexts, which is what standard dynamic semantics predicts. The accessibility of the antecedent under the scope of a modal to a pronoun also under the scope of a modal, however, was something that standard dynamic semantic accounts of anaphora as well as more traditional accounts could not predict; and the accounts of Roberts (1989) and Frank (1997); Frank and Kamp (1997) provided significant insights into the semantics of anaphoric expressions.

Note that tense also plays a role in determining the felicity of modal subordination. Compare the following examples with (2.5a) above.

- (2.6) a. A wolf might have walked in. It might have had big teeth.  
 b. A wolf might have walked in. It might have big teeth.

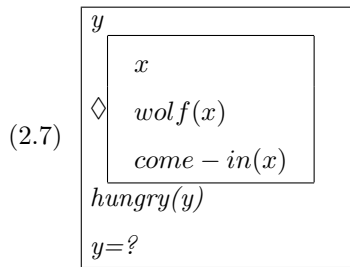
Although the judgements are subtle, it seems that (2.6a) admits a nonspecific (*de dicto*) reading for the indefinite *a wolf*, the modally subordinated reading. However, (2.6b) only allows for a *de re* reading of the indefinite on which it refers to a specific wolf.

In more recent years, a number of scholars have refined Karttunen's intuition and formalized it (Karttunen's paper was largely descriptive), generally using some form of dynamic semantics. Some of these approaches will be discussed later in



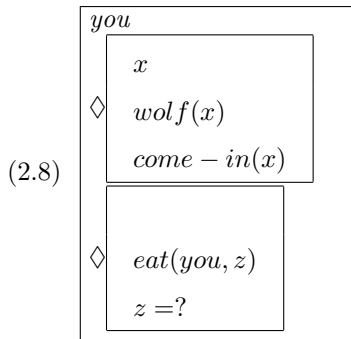
the chapter. The general conclusion of this research has been that modal operators are able to license modal subordination because of their inherently quantificational structure, which incorporates an overtly expressed scope and a covert restrictor (Lewis, 1970; Kratzer, 1981). This covert restrictor is then enabled to take its content from the previous sentence (with its operator).

It seems natural, based on (2.2a), to conclude that the same idea should work for modally quantified sentences as for other cases of operators in DRT; that is, we should have the modal introduce a subordinate DRS in which the referent for *a wolf* is introduced, making it inaccessible to later pronouns given the DRT accessibility conditions. Indeed, placing the modally quantified part of (2.2a) into a subordinate DRS modified by a standard modal possibility operator gives us the right conditions on accessibility, as shown by the following DRS:



In this DRS, the referent  $x$  is in a subordinate DRS, and so isn't accessible as an antecedent to  $y$ , which correctly predicts that the discourse is infelicitous.

What predictions does a DRT analysis of this sort make about (2.2b)? Here, both sentences will introduce subordinate DRSs, giving the following representation:



In this DRS, both  $x$  and  $z$  are in subordinate DRSs, and consequently neither will be accessible to the other for anaphoric coreference.<sup>5</sup> Manifestly, the prediction made here is not the correct one. The rest of this chapter will propose a new account of modal subordination; accounts of modal subordination within DRT that have attempted to solve this problem will be discussed at the end of chapter 3.

The natural way to account for Veltman’s observations and the natural way to account for the data on modal subordination don’t easily combine. They involve different techniques for evaluating formulas with respect to a set of indices or points of evaluation: one approach is to evaluate a formula relative to properties of sets of such evaluation points—a sort of ‘collective’ approach (to use some terminology from another area of semantics, the interpretation of plurals); the other evaluates a formula relative to individual evaluation points—a ‘distributive’ approach. The history of the efforts in this area suggests that a good semantics for the modals has to be both collective and distributive with respect to points of evaluation.

But before we get to theory, let’s look at a bit more data about modals. An interesting use of the epistemic modal *would* concerns its effects as an agreement marker in discourse. In (2.9), B’s utterance conveys an agreement with A’s assertion by conveying that in all or most of B’s epistemic possibilities, Kim’s teasing Pat was something to be expected.

---

<sup>5</sup>The same will prove to be true in discourses like that in footnote 3, where the subDRSs are under the scope of negation rather than a modal, though as I said before I will not consider ‘modal subordination’ with negation further in this dissertation, as its status is still controversial.

(2.9) A.: Kim teased Pat.

B.: Kim would do that.

This leads one to wonder about the relationship between *might* and *would*. Their semantics must be strongly interconnected, and they appear to be weak duals, in the sense that one cannot have *mightp* and *would¬p*. Similarly, most speakers balk at *wouldp* but *might notp*. I will assume something slightly stronger—namely that it's the case that *wouldp* implies that *mightp*, which intuitions also appear support (witness the implication in (2.10c)).

(2.10)a. #John might come to the party but John would not come to the party.

b. #John would not come to the party but John might come to the party.

c. John would come to the party  $\rightarrow$  John might come to the party.

The semantics of the modals is rich and intriguing. But especially intriguing is how so many modals combine productively together with a conditional whose antecedent is adjusted for the appropriate mood to create counterfactuals of various kinds.

(2.11)a. If I were not to sleep tonight, I would topple over tomorrow (I might topple over tomorrow).

b. What should be your mascot if you were a school? (Google)

c. If we were to get more serious, should I tell him my age? (Google)

d. If you were a school, your mascot should be a fierce animal.

e. If it were easy, anyone could do it (Google, *Converge Magazine*).

The ease with which modals and conditionals combine strongly suggests that we should try to build a compositional account of the semantics for counterfactuals. The slight differences in meaning between the different modals create different sorts

of counterfactuals; for instance *should* and *would* don't have quite the same range of meanings; *should*, and nor do *could* and *might*. And not unexpectedly, there is a definite change in meaning between (2.11e) and the variant *if it were easy, anyone might do it*. Asher and McCreedy (2004) presents a detailed account of how the semantics of conditionals and modals interact; I will not review this analysis here, but instead restrict attention to modal subordination and the Veltman data, which will provide the basis for my analysis of Japanese modals and modal subordination in chapter 3.

## 2.1 Previous Accounts

How can we go about accounting for all the facts described above? There are two broad parameters in the way dynamic semantics may describe the effects of an utterance on a context: first it may be *distributive* and define the effects of a sentence on each element of the context or not (this is the collective view); secondly these effects may affect those elements of the context or not. If not the semantics is called *eliminative*. DRT of Kamp and Reyle (1993) as well as DPL (Groenendijk and Stokhof 1990) are examples of distributive semantics that are not eliminative, whereas Veltman's (1985, 1996) update semantics which he uses for his account of the modals, is eliminative but not distributive.

Let's take a look at Veltman's update semantics first. Contexts are understood as sets of worlds and the epistemic sense of *might* that is to be captured is one that surveys the possibilities common to the discourse participants who have accepted the information in the discourse so far. Thus, the picture is that as discourse proceeds the set of epistemic possibilities left open to the participants gradually narrows as they build up a common ground of information between them. When updating a context with a formula, we either eliminate worlds from that context that do not satisfy it or the formula operates as a 'test' on the context as a whole. For-

mulas of the form *might* $\phi$ , *would* $\phi$  and conditionals function as tests on the context.

Here is the semantic clause for formulas of the form *might* $\phi$ :

- Veltman’s account of *might*:
- Let  $\sigma$  be a set of possible worlds and  $\phi$  a formula of a propositional language with the usual interpretation at each world. Then:

$$\begin{aligned}\sigma + \textit{might}\phi &= \sigma \text{ if } \sigma \cap \phi \neq 0 \\ &= 0 \text{ otherwise.}\end{aligned}$$

The idea is that an information state will pass the test of *might* $\phi$  whenever  $\phi$  is true in at least one world in the context. But updating contexts with factual information such as in (2.1c) will eliminate all those worlds that support the epistemic possibility that it is sunny, and so then attempting to update the information state with *it might be sunny* will yield an empty information state, a sign that something has gone wrong.

Veltman’s theory is a theory that does not appeal to the speaker’s private beliefs or intentions. An alternative is to adopt a much more plainly pragmatic story in line with the pragmatic story told for (2.1c): we could easily adapt Grice’s maxim of quality to the effect that if a speaker utters (2.1b) he has violated the rule that you don’t say something you don’t know to be true. But even if the speaker is lying and so is already violating the maxim of quality, (2.1b) remains incoherent on an epistemic reading. That is the intuition that Veltman intends to capture.

Veltman’s theory captures the data about the interactions between *might* sentences and non modal sentences effectively. But it suffers defects when we turn to other data about the modals, in particular the data on modal subordination or how modal statements interact dynamically. *Might* is just a test on the whole information state according to Veltman’s semantics; so if the update with *might* $\phi$  is successful, then we get back the same context that we started with. The facts about modal subordination, however, require us to isolate the set of epistemic possibilities

in which  $\phi$  in order to further modify them; e.g., we must isolate those worlds in the context where the wolf walks in as in (2.5a), in order to further refine those possibilities as those where the hearer gets eaten first. This is simply not possible on the Veltman semantics: we can't isolate the relevant set of epistemic possibilities and we can't modify that set, unless we update with a nonmodal assertion. But the facts about modal subordination show that modification is possible with modals and that this modification is not equivalent to updating with a nonmodal assertion. Veltman's test semantics for *might* alone can't furnish us an appropriate context in which to evaluate subsequent modal claims. And we will see in the next chapter that the same facts hold for the Japanese possibility modal *kamosirenai*.

There are other difficulties with update semantics as well that have to do with the interpretation of quantification and anaphoric links across sentences. Most research in dynamic semantics has adopted the distributive semantics for quantification (e.g., Groenendijk and Stokhof 1991, Kamp and Reyle 1993), and it is within this framework that the first accounts of the facts of modal subordination were developed. Roberts' (1987) account of modals, for instance, considers them to be two place operators, one argument of which is given by what is in the scope of the modal operator, the other given by some contextually available proposition. Thus, for (2.5a), the proposition under the scope of the *might* operator in the first sentence provides the first argument to the operator *would* in the second sentence, while the second argument is given by the material under the scope of the *would* in the second sentence. This furnishes the intuitively correct reading of second sentence with the following semantics of  $would(\phi, \psi)$ : every element of the context that satisfies  $\phi$  also satisfies  $\psi$ ; in other words, this semantics says that the formula *it would eat you first* is satisfied in a context just in case every element of the context in which a wolf walks in is also an element in which the wolf eats the hearer first. This is a distributive semantics for the modal operators.

Two place operator accounts like Roberts's (but see also Frank 1997) don't specify the first argument of a modal operator; that's left to pragmatics. So by itself these accounts don't get us the right interpretation of (2.5a); e.g., another possible interpretation of (2.5a) is that the first argument of *would* is not just the proposition under the scope of *might*, but any other contextually salient proposition, including propositions like the one expressed by *there's a wolf*. This of course is not an intended reading of the example. Further, the distributive semantics doesn't predict the data in (2.1ab); any number of contextually available antecedents might make (2.1b) acceptable. The two place operator accounts don't capture the interactions between modal and nonmodal information. We need a semantics for *might* that captures both the data about modal subordination and Veltman's observations.

## 2.2 Semantics

### 2.2.1 Combining Distributive and Non-Distributive Intuitions

Our goal, then, is to account both for the motivating data of the two place operator approach and of the non-distributive semantics for the modals. I begin with a standard dynamic semantic formalism like that of DPL, which has a very good account of quantification and intersentential anaphora. This semantics was already introduced in chapter 1; I reproduce it here for convenience (in a slightly different form). The elements of the context are world assignment function pairs. Let  $\models$  be a standard Tarskian notion of static satisfaction and  $M$  a standard first order model.

- $(w, f) \models Pt_1, \dots, t_n \|^A(w', g)$  iff  $g = f \wedge w = w' \wedge \mathcal{A}, w, f \models Pt_1, \dots, t_n$  iff  $\langle \|t_1\|_{(w,f)}^A \dots \|t_n\|_{(w,f)}^A \rangle \in R_w^A$
- $(w, f) \models t_1 = t_2 \|^M(w', g)$  iff  $g = f \wedge w = w' \wedge \mathcal{A}, f \models t_1 = t_2$
- $(w, f) \models \phi \wedge \psi \|^A(w', g)$  iff  $\exists w'' h(w, f) \models \phi \|^A(w'', h) \wedge (w'', h) \models \psi \|^A(w', g)$   
in other words:  $(w, f) \models \phi \|^M \circ \|\psi\|^A(w', g)$

- $(w, f) \Vdash \neg\phi \Vdash^A (w', g)$  iff  $f = g \wedge w = w' \wedge \neg\exists w'', h(w, f) \Vdash \phi \Vdash^A (w'', h)$
- $(w, f) \Vdash \exists x\phi \Vdash^A (w', g)$  iff  $w = w' \wedge \exists a \in A(w, f \frac{a}{x}) \Vdash \phi \Vdash^A (w', g)$

In order to capture Veltman's examples in (2.1ab), we need to test the current information state when evaluating sentences of the form *might* $\phi$ . So we need to combine a DPL style semantics for the quantifiers with an update style semantics for modals. But we cannot simply use the DPL clauses for quantification with the operations for truth functional and modal operators defined by simple operations on sets. Because of the way existential quantifiers operate by resetting values of assignment functions, a standard approach to negation for example at the set level gets things wrong. Here's the standard and common sense clause for negation when trying to define operations on sets of world assignment pairs:

- $\sigma + \phi = \sigma - (\sigma + \phi)$ .

However, now consider  $\sigma + \neg\exists x\phi$ . If the existential is to reset values of assignment functions as we expect in dynamic semantics then  $\sigma + \exists x\phi$  may very well be disjoint from  $\sigma$  depending on the choice of resetting values. So  $\sigma + \neg\exists x\phi = \sigma$  and it could very well be that we can then have a non-empty update result by updating with  $\sigma + \exists x\phi$ . We can solve this by using the standard DPL clauses and lifting the results to an information state level keeping everything distributive. As Fernando (1993) noted, we can make the non functional DPL semantics functional at the level of sets of world assignment pairs, or we could define a relational interpretation at the level of sets, mimicking DPL's nondeterministic behavior. But this alone won't give us the right semantics for the modals because it's still completely distributive and not collective..

The terminology I've used to talk about ways of interpreting modals suggests an analogy with the semantics of plurals. The literature on the semantics of plurals has demonstrated that not only are there sentences with collective interpretations



and sentences with distributive interpretations but there are discourses combining both distributive and collective interpretations (the example is from Asher and Wang 2003):

(2.12) Three boys worked tirelessly and mowed the whole meadow.

In this example we understand each boy working tirelessly individually and that collectively they act together so as to mow the whole meadow. Collective and distributive interpretations of plurals are analogous to non-distributive and distributive interpretations of modals: collective interpretations test sets of assignments within a context, while distributive interpretations are determined relative to individual assignments that comprise the individual world assignment pairs in the context. Similarly, we need to exploit sets of epistemic possibilities or sets of world assignment pairs to interpret some modals, while integrating this within a generally distributive semantics.

For a variety of reasons that I won't go into here (see Asher and Wang 2003 for details though), the only way known to integrate the collective and distributive approach to assignments is to complicate the notion of a dynamic context by making each element in the context contain information about the assignments besides its own that form a natural group in the context. Here I am going to do the same for the evaluation points of basic dynamic states. Further, we'll need a non-deterministic relation between elements of evaluation; this non determinism is necessary at the level of assignments for plurals since, to put it somewhat roughly, plural indefinites may pick out many distinct candidate sets of individuals as values for the plural variable.

To define each set of epistemic possibilities properly, I proceed inductively, for two reasons. The first is that some operators relying on the set of epistemic possibilities may nest within others. The second is that, although this definition can be simplified, avoiding induction, doing so complicates the construction a good deal.

If we have  $E$  be a function from an information state to a set of information states induction is not needed. However, doing so would result in additional complications about assignments; we would need  $E$  to keep assignments constant from its domain to its range (*unless* the clause updated with includes an existential quantifier. Defining this is complicated, and it turns out to be probably simpler to use the inductive definition, particularly when it comes time to define update, as we will see later. I believe that this later simplicity makes the recursive definition worth the added complexity it introduces. I begin with some choice  $\alpha$  of some set of world assignment pairs and use that choice to inductively build up more complicated sets of epistemic possibilities.

- Set  $E_{\alpha,0} \subseteq \mathcal{P}(W \times \$)$ , where  $\$$  is the set of all assignment functions.
- $E_{\alpha,n+1} \subseteq \mathcal{P}(W \times \$ \times E_{\alpha,n})$
- $\mathcal{E}_\alpha \subseteq \mathcal{P}(\bigcup_{n \in \omega} E_{\alpha,n})$

These epistemic states will be used in the following way. The first and second elements of a state  $\sigma$ —which correspond to the actual world and actual assignment function—will be checked against the information in the third element (the recursive part), which is the part acted upon by discourse update.

Every set of epistemic possibilities  $\mathcal{E}_\alpha$  is thus well-founded. Dynamic contexts that form the inputs to the interpretation of formulas are triples of  $\langle w, f, \mathcal{E}_\alpha \rangle$  for some  $\alpha$ . We refer to the third element of an information state  $\sigma$  as  $3(\sigma)$ , where  $3$  is a projection function from  $\sigma$  onto its third element. More generally, we make use of the projection functions  $1, 2, 3$  to pick out the world, assignment function or set of epistemic possibilities of a context element respectively. We adopt the constraint that epistemic possibilities at the outset include the actual world and the actual assignment, though updates with new epistemic possibilities may make the set of

possibilities no longer include the actual world. So we will stipulate for the elements  $\sigma_0$  of the initial context that:  $\exists \sigma' \in \bigcup(3(\sigma_0)) (1(\sigma_0) = 1(\sigma') \wedge 2(\sigma_0) = 2(\sigma'))$ .

I now state our dynamic DPL style semantics in terms of our new context elements.

- $\sigma \| R t_1, \dots, t_n \| \mathcal{A} \sigma'$  iff  $\sigma = \sigma' \wedge \langle \| t_1 \|_{(1(\sigma), 2(\sigma))}^{\mathcal{A}} \cdots \| t_n \|_{(1(\sigma), 2(\sigma))}^{\mathcal{A}} \rangle \in R_{1(\sigma)}^{\mathcal{A}}$
- $\sigma \| t_1 = t_2 \| \mathcal{A} \sigma'$  iff  $\sigma = \sigma' \wedge \| t_1 \|_{(1(\sigma), 2(\sigma))}^{\mathcal{A}} = \| t_2 \|_{(1(\sigma), 2(\sigma))}^{\mathcal{A}}$
- $\sigma \| \phi \wedge \psi \| \mathcal{A} \sigma'$  iff  $\sigma \| \phi \| \mathcal{A} \circ \| \psi \| \mathcal{A} \sigma'$
- $\sigma \| \neg \phi \| \mathcal{A} \sigma'$  iff  $\sigma = \sigma' \wedge \neg \exists w'', h \sigma \| \phi \| \mathcal{A} \sigma_{\frac{1(\sigma)}{w''}, \frac{2(\sigma)}{h}}$
- $\sigma \| \exists x \phi \| \mathcal{A} \sigma'$  iff  $\exists a \in A \sigma_{\frac{a}{x}} \| \phi \| \mathcal{A} \sigma'$ , where  $\sigma_{\frac{a}{x}}$  is the result of replacing  $2(\sigma)$  with  $2(\sigma)_{\frac{a}{x}}$

So far nothing here is out of the ordinary; the semantics acts just as in standard DPL (as introduced in Chapter 1). And note that we have not yet made any reference to  $3(\sigma)$ , the recursive element of the epistemic states; these definitions only make use of the actual world-assignment pair, again just as in standard DPL. But we're missing something at this point. As discourse proceeds we learn things and so refine and indeed revise our epistemic possibilities in light of what has been learned. Let us call the *discourse context* that set of triples that are the result our output of the evaluation of successive sentence-tokens in a discourse. A discourse context is very much like an epistemic possibility—a set of world assignment, epistemic possibility triples; and it contains the information of what has been said up to this point. Simplifying matters considerably, I take what has been said in discourse has having been established and accepted as part of the common ground (thus passing over all the problems of correction, denial and disagreement—but see Asher and Lascarides 2003 or Asher and Gillies 2003 for discussions of these phenomena). Thus, whatever is true or supported in such a discourse context should be reflected in the set of epistemic possibilities of those triples  $\sigma$  that are part of the discourse context.

To define this constraint, I follow Asher and McCready (2004) and introduce a particular style of *discourse update*, and auxilliary notions of *descendant satisfaction*, written  $\models_d$ , and revision. Descendent satisfaction in effect simply requires that there be some element in a set of possibilities that verifies the formula in question; this notion lifts our distributive semantics over context elements to sets of such elements (the term ‘lift’ is due to Groenendijk et al. 1996, though Asher and McCready (2004) develop the notion somewhat differently). Thanks to the work of Lewis, Spohn and others, it is straightforward to define a revision function  $\star$  on epistemic possibilities if we assume a partial ordering on the elements of epistemic possibilities (see e.g. Lewis 1973b). This partial ordering forms a system of spheres centered around each element  $\sigma$ . A set of such elements can also have a system of spheres  $S(\epsilon) = \{\cup(S_n(\sigma)) : \sigma \in \epsilon\}$ .

- Definition of Descendance and Satisfaction by epistemic possibilities
- $\sigma$  has a  $\phi$  descendant  $\sigma'$  iff  $\sigma[\phi]\sigma'$   
i.e. there must be some epistemic state in  $\sigma$  that verifies  $\phi$
- $\langle \epsilon, \epsilon' \rangle \models_d \phi$  iff every  $\sigma \in \epsilon$  has a  $\phi$  descendant in  $\epsilon'$ .  
i.e. every epistemic state in  $\epsilon$  must contain an element that verifies  $\phi$
- $\|\phi\| = \{\langle \sigma, \sigma' \rangle : \sigma' \text{ is a } \phi \text{ descendant of } \sigma\}$   
i.e. the denotation of  $\phi$  is the set of  $\phi$  descendents of  $\sigma$
- Let  $S_n(\epsilon)$  be the smallest sphere around  $\epsilon$  such that elements in  $S_n(\epsilon)$  have  $\phi$  descendents. Then  $\epsilon \star \|\phi\| = \{\sigma : \exists \sigma' \in S_n(\epsilon) \sigma \text{ is a } \phi \text{ descendant of } \sigma'\}$ .  
i.e.  $\epsilon \star \|\phi\|$  is the set of  $\sigma$ s that are  $\phi$  descendents of some element in the closest sphere to  $\epsilon$
- $\mathcal{E} \star \|\phi\| = \{\epsilon \star \|\phi\| : \epsilon \in \mathcal{E}\}$ . (this is the ‘higher’ version of the previous definition)

With these notions we can now turn to the central notion of discourse update. The idea is that updating  $\sigma$  with  $\phi$  keeps the actual world and assignment constant (for all variables free in  $\phi$ ), while  $3(\sigma)$  is the result of applying the  $\star$  operation to the input information state and  $\phi$ . The result is that we limit epistemic possibilities to those that verify  $\phi$ , while not changing the actual world or assignment function (unless  $\phi$  contains an existential quantifier).

- Definition of Discourse Update:
- Let  $\phi$  be a modal free formula. Then  $\sigma$  is a  $\phi$  discourse update of  $\sigma'$  iff  $\exists\sigma''$  such that  $(\sigma'[\phi]^A\sigma'' \wedge 1(\sigma) = 1(\sigma'') \wedge 2(\sigma) = 2(\sigma''))$  and  $3(\sigma) = 3(\sigma') \star \|\phi\| \wedge \forall\epsilon \in 3(\sigma) \forall\sigma''' \in \epsilon \ 2(\sigma''') =_x 2(\sigma)$  for all  $x$  free in  $\phi$
- Let  $\phi$  be a formula of the form *might* $\phi$ , *would* $\phi$  or  $\phi \Rightarrow \psi$ . Then  $\sigma$  is a  $\phi$  discourse update of  $\sigma'$  iff  $\sigma'[\phi]^A\sigma$

The notion of discourse update contains the idea that nonmodal information introduced into the discourse must be reflected in the updated epistemic possibilities (hence the need for the revision operator  $\star$ ). Further, the bindings of variables that occur free in a formula carry their already established values. Discourse update helps us to evaluate sequences of formulae that are translations of our examples. For instance, in evaluating (2.1ab), we check whether the translations of those formulae give us a sequence of coherent discourse updates, where a coherent discourse update is one where for some input  $\sigma$  there is a non-empty output. I will look at this example in more detail after discussing the semantics of the modals.

A feature of discourse update that might strike one as odd is that modal formulas do not affect the epistemic possibilities in discourse update. But they don't need to, since they already do so in their basic semantics—that is, in how they affect dynamic transitions over  $\sigma$ . Here is the basic semantics for English *might* and *would*. The semantics of the epistemic modals can either test or change the second

element. Here  $\epsilon\star$  is the result of applying the  $\star$  operation to the element  $\epsilon$  for some formula  $\varphi$ . The system will be extended to deontic modalities in chapter 4.

- $\sigma[might\phi]_{\mathcal{A}}\langle 1(\sigma), 2(\sigma), \mathcal{E}' \rangle$ , where  $\mathcal{E}' = \{\epsilon' : \exists \epsilon \in 3(\sigma)\langle \epsilon, \epsilon' \rangle \models_d \phi\}$ ,  
if there is such an  $\epsilon$ ;  
 $\sigma[might\phi]_{\mathcal{A}}\emptyset$  otherwise.
- $\sigma[would\phi]_{\mathcal{A}}\langle 1(\sigma), 2(\sigma), \{\epsilon' : \exists \epsilon \in 3(\sigma)\langle \epsilon, \epsilon' \rangle \models_d \phi\} \rangle$ ,  
if  $\forall \epsilon \in 3(\sigma)\exists \epsilon^*\langle \epsilon, \epsilon^* \rangle \models_d \phi$ ;  
 $\sigma[would\phi]_{\mathcal{A}}\emptyset$  otherwise.

The operator *might* intuitively involves an existential quantification over epistemic possibilities. And like all existentials in dynamic semantics, it has a special status—that of resetting, in this case, epistemic possibilities. But this resetting is dependent on a test of the input; if the previous epistemic possibilities admit an update with the proposition under the scope of the *might*, then the resetting proceeds—if not, the update fails in the sense of producing no descendants for the input. This semantics incorporates the test idea of Veltman’s semantics but it is not itself a simple test; it allows information under the scope of the *might* operator to transform the epistemic possibilities in the input. It also differs from ‘accommodation’ views of *might* like that of von Fintel (2002), according to which *might* always enlarges the epistemic possibilities under consideration. On this view it rather refines certain epistemic possibilities that must be already in place.

*Would* works somewhat differently; it requires that every epistemic possibility in  $3(\sigma)$  be revisable to some other possibility (i.e. there must be another possibility in our system of spheres) that verifies  $\varphi$ . If this operation is impossible, we are left with an empty output; the update fails. Of course, in practice this will rarely happen, for the goal of the  $\star$  operation is to shift the normality or plausibility of the epistemic possibilities until one is found that can verify the proposition  $\star$  takes.

This point aside, it may be clear to the reader that *would* as defined here supports modal subordination; the reason is that  $\exists(\sigma)$  can be revised to coincide with the set of possibilities output by an earlier modal, which will contain an antecedent for anaphora.

Our epistemic semantics for the simple modals is now complete. Unlike Veltman (1996) or Groenendijk et al. (1996), we separate out a set of epistemic possibilities associated with each world assignment pair, on which epistemic formulas operate. So our notions of logical consequence and validity can remain those familiar from DPL with one important change: we replace the basic notion of a dynamic transition with our notion of discourse update. This is needed to ensure that new factual information affects the epistemic possibilities in the relevant way.

A possible objection to this account is that it takes modals to be one-place operators, in contrast to most of the current linguistic literature (cf. Kratzer 1981; Roberts 1989; Frank 1997, *i.a.*), in which modals are analyzed as dyadic operators. This objection has some merit. But two points militate against it. First, the theory of modals presented here instantiates a notion of context dependence by its dynamic nature; any change in the speaker's facts and beliefs about the world will make corresponding changes in her set of epistemic possibilities. In a sense, this situation is analogous to the 'covert restrictors' of Kratzer-style theories; one difference, however, is that Kratzer means to account for *all* modalities, while our theory is designed only for epistemic ones.

This semantics for *would* is sensitive to the fact that *would*  $\phi$  is not equivalent to  $\phi$ . This is a virtue. The fact that the discourse context supports *would* $\phi$  and hence that all of the epistemic possibilities of any element of the context support  $\phi$  does not guarantee that the discourse context supports  $\phi$ , which is what our notion of entailment requires. The epistemic possibilities might not cover all the *logical* or *semantic* possibilities compatible with the information presented in the

discourse or otherwise available from the context. So in sum:  $would\phi \not\leftrightarrow \phi$ . Our semantics, like Veltman’s original semantics, verifies  $\phi \models might\phi$  by the definition of *might* and the definition of discourse update. On the other hand,  $might\phi \not\models \phi$ . Resetting the epistemic possibilities to reflect  $\phi$  doesn’t necessarily affect the actual world of evaluation; although the actual world and assignment of evaluation are elements of the epistemic possibilities associated with them in the empty information state. Updating with modal formulas may make our epistemic possibility set go counterfactual.

These clauses also verify the desired entailment from  $would\phi$  to  $might\phi$ . But we also have:  $\phi \models would\phi$ . This might seem to be a potential problem. But clearly it’s pretty terrible to have  $\phi$  and  $\neg would\phi$ :

(2.13)a. ??John is at the party, but he wouldn’t be at the party.

b. ?John is at the party; so he would be at the party.

(2.13b) may be pragmatically difficult, but semantically OK. (2.13a) is nonsense unless we understand some sort of suppressed antecedent of a counterfactual as occurring there, for which there is little if any evidence.

Further, this semantics predicts that because the epistemic possibilities must always verify what has already been established in the discourse, Veltman’s examples (2.1ab) immediately fall out as predicted.  $might\phi$  resets the epistemic possibilities of an element of the discourse context  $\sigma$  to those where  $\phi$  holds as long as  $\phi$  was an epistemic possibility in  $\sigma$ . So updating an empty information state with *it might be sunny* simply resets the possibilities and we can then update with the factual information that it’s not sunny which will revise the epistemic possibilities to reflect the fact that we have now learned that it’s sunny. However, updating first with *it’s not sunny* makes a subsequent update with *it might be sunny* fail, because the input information state does not contain it’s being sunny as an epistemic possibility. Further, our semantics predicts that examples like (2.10ab) should not yield any



coherent output for any given input state.

Finally, this semantics makes some intuitive predictions about the cases of stand alone *would*. Consider again (2.9). When attached to *A*'s assertion it's natural to understand *B* as saying that in all of his epistemic possibilities, what *A* says turns out to be true. It marks a form of agreement, which is intuitively what is going on in (2.9b). The anaphoric account would make *B*'s assertion with stand alone *would* some sort of logical truth on the standard semantics for *would* and so should be ruled out on pragmatic grounds of informativeness.

### 2.2.2 Modal Subordination and Discourse Structure

One of our main goals was to account for the basic facts of modal subordination. The classic (2.5a) works as expected. The possibility introduced by the *might* modality is picked up straight away and modified by a *would* sentence. A *might* sentence can also felicitously follow another *might* sentence; our semantics predicts modal subordination phenomena in that case as well. The updating of epistemic possibilities with non modal information, which may include binding information, allows us to quantify into epistemic possibilities as in:

(2.14) A student just walked in. Pat might grant him an interview.

To see what happens, assume that the first sentence is of the form  $\exists x Wx$ . So the existential quantifier will reset the value of  $x$  and the input context for  $Wx$  will be  $\sigma_x^a$ . Suppose  $\sigma_x^a$  supports  $Wx$ . Then the output context's epistemic possibilities will also support  $Wx$  with the assignment of  $a$  to  $x$ . The second sentence in (2.2.2) resets the epistemic possibilities, but since each one of these is a descendant of one in the input set of epistemic possibilities, this means that subsequent free occurrences of the variable  $x$  introduced by pronouns in the second sentence of (2.2.2) will carry the same value  $a$ .

On the other hand we cannot bind variables outside a modal context with quantifiers introduced inside a *might* or *would* operator.

(2.15)# A wolf might have walked in. He bit you first.

Although the utterance of the *might* sentence resets the epistemic possibilities on the proposed semantics, it doesn't affect the actual world of evaluation or the actual assignment function. So the value that the variable is reassigned by the existential quantifier cannot be passed onto the occurrence of the variable introduced by the pronoun *he*.<sup>6</sup>

One of the salient features of this approach is that the possible interpretations of modal subordination sentences is quite restricted. Consider some variants of our wolf example (2.5d-e):

(2.5) d. A tiger might walk in. Then a wolf might walk in. They might eat you first.

e. A wolf might walk in. It probably wouldn't eat you. But a tiger might walk in, and it definitely might eat you.

(2.5d) is an easy case for the present view. Since *might* modalities refine existing epistemic possibilities, this example shows how one might utterance can affect the interpretation of the second, and the result in this case is that the epistemic possibilities to be considered in interpreting the third clause are those where a wolf *and* a tiger walk in. A simple two place operator account like Roberts's cannot account for such examples, because it requires using both propositions under the scope of the *might* operators in the first and second clauses to interpret the third; Frank (1997) can but at the cost of stipulating an operation of propositional fusion on propositional anaphors that threatens to generate too many possible antecedents.

---

<sup>6</sup>If we had developed our semantics with partial functions and had forced the pronoun to introduce an occurrence of the same variable as that introduced by the indefinite inside the modal, the discourse would be uninterpretable.

As one example, consider (2.16). It looks as though the two place operator approach makes such examples acceptable when they are not, because the proposition that a wolf walks in is plainly available as an antecedent.

(2.16) A wolf<sub>*i*</sub> might walk in. But then again there might not be any wolf. It<sub>*i*</sub> would scare you.

The present approach requires the interpretation of *would* on the standard dynamic semantics view of discourse interpretation to be constrained by the epistemic possibilities introduced by the *might* clause in the previous sentence. But these possibilities deny the existence of any wolf and this makes impossible the intended interpretation of the pronoun.

Another problem for something like Frank’s account of modal subordination with the possibility of fusing propositional antecedents is (2.5e). The modal in the fourth clause in (2.5e) could take any of the propositions expressed by the last three sentences on the two place operator approach, whereas on the current approach the modal is constrained to take the last updated set of epistemic possibilities, predicting that there will be both a wolf and a tiger present. Salience concerns dictate that the tiger is the preferred eater. Now one could get the wolf to be the cause of the addressee’s fright, if the context contained the information that wolves normally don’t eat people unless there’s a tiger present, in which case the wolves become very competitive and aggressive—and tend to eat people present. We note that this interpretation comes for free on our approach, since all this information will be built into the context and can easily reverse the salience of the tiger in favor of the wolf. The two place operator approach would have to somehow include all this information in the first argument of the operator leading to complex merge operations over material both inside and outside modal operators, again seriously threatening overgeneration as well as being very *ad hoc*.

Let me now make good on my promissory note for a brief discussion of ‘modal’ subordination with negation. Discourse structure offers us the possibility of accounting for examples like these, which feature prominently in Frank’s (1997) account of modal subordination.

(2.17)a. I didn’t buy a refrigerator. It would have taken up too much room.

b. I didn’t buy a refrigerator. It would have cost too much.

These also don’t follow straightforwardly on my account. But there are several options. One is to postulate a special discourse connection here according to which there is a causal link between the possibility described under the negation and the second clause containing the modal, which I gloss as  $\neg p$ , but if  $p$  then the result would have been  $q$ —or,  $p$  would have caused  $q$ . Furthermore,  $q$  in turn is a reason for not doing  $p$ . The pattern of a negated sentence discourse linked to a sentence with an epistemic modal suggests a type of elliptical explanation involving a conditional, a particular type in other words of discourse relation between two constituents in a discourse. This discourse link differs truth conditionally from the sort of narrative link one gets with the (2.5) examples. This kind of account is supported by the fact that negated modal subordination is not universally possible, as shown by the examples in (2.18), which lack the discourse connection I describe.

(2.18)a. # I didn’t buy a refrigerator. I would like it.

b. I didn’t buy a refrigerator. I didn’t like it. (*de re* only)

Of course, the two place operator approach can also get the truth conditions right for examples like (2.17), but it fails to explain why contents under negation are special in a way that disjunctions are not:

(2.19) Either a wolf is walking in that door in ten minutes or a tiger is. It #would (will) eat you first.

The explanation for the special status of negation in these cases seems not to stem from the meaning of the operator itself but rather from the rhetorical structure that its uses in discourse suggest.

## **2.3 Summary**

This chapter has provided a framework for epistemic modalities and conditionals, making use of dynamic operations on sets of epistemic possibilities. In the chapter that follows, I will use this framework to analyze three Japanese modals, and how they work with modal subordination.

# Chapter 3

## Japanese Modality and Subordination

This chapter broadly considers the realization of ‘modality’ in Japanese. I begin by looking at three modal expressions—*kamosirenai*, *hazu-da*, and *nitigainai*—in some detail. As we will see, standard modal logic is an even more inadequate tool for characterizing the Japanese modals than for modals in Indo-European languages, due to the evidential character possessed by the Japanese expressions. I thus use the dynamic system presented by Asher and McCreedy (2004) and extended in the last chapter to model the Japanese modals, augmented with a presuppositional analysis of evidentials stated in (S)DRT. Before giving a definitive semantics for these three modal expressions, however, I consider the realization of modal subordination in Japanese, which also plays a role in how the Japanese modals should be characterized semantically. The chapter concludes with a discussion of how the analysis captures the modal subordination facts.

## 3.1 Background on Japanese

To keep the issues clear as they are introduced, it will be useful to present some background here on the Japanese tense-aspect system, and on the interpretation of Japanese nominals, both of which will be relevant to the discussion of modal subordination in later chapters. I will also show some of the major discourse particles in the language, which also will be needed to understand what is happening in modal subordination.

### 3.1.1 Tense and aspect in Japanese

The Japanese tense system has only two tenses, generally called past and nonpast, although some authors, for instance Ogihara 1989, take the nonpast tense to actually be underspecified with respect to temporal location in present or future. These tenses are shown in the following table. Thus any nonpast expression in Japanese in principle can have a futurate interpretation. This fact will be relevant to the discussion of modal subordination to follow in the next chapter.<sup>1</sup>

#### Japanese Tenses and Aspect.

<i>-ta</i>	past (perfective)
<i>-u</i>	nonpast
<i>-teiru-</i>	nonpast imperfective

### 3.1.2 Japanese discourse particles

The discussion of Japanese modal subordination to follow will crucially involve both discourse relations and discourse particles. For this reason, I will use a number of examples exhibiting discourse particles—items like *because*, *so*, and *then* which serve to overtly indicate various discourse relations. It will be convenient to introduce

---

<sup>1</sup>Note that the characterization of *-teiru* as imperfective aspect is a simplification, in that it can also serve to indicate the result states of events (Ogihara, 1998). We will not be concerned with the resultative reading in this dissertation.

them briefly here so the texts we look at later will be clearer. I do this in the form of a table, also indicating whether they appear clause-initially or clause-finally. Items like *sorede* with more than one meaning and associated discourse relation I have given multiple entries.

**Japanese Discourse Particles (nonexhaustive).**

Particle	Gloss	Position	D. Relation
no-da, n-da	because	final	Explanation
kara	because	final	Explanation
sore-de <sub>1</sub>	because	initial	Explanation
sore-de <sub>2</sub>	then	initial	Narration
sosite <sub>1</sub>	then, after that	initial	Narration
sosite <sub>2</sub>	then, after that	initial	Elaboration
sorekara	after that	initial	Narration
ga	but	final	Contrast
kedo	but	final	Contrast

This is not, of course, an exhaustive listing of Japanese discourse particles. However, it will suffice for the data I will consider in this dissertation.

### 3.1.3 Japanese nominal interpretation

As in other Asian languages, bare nominals are prevalent in Japanese. As noted by Chierchia (1998) and Dayal (1999), bare nominals in languages of this sort can be interpreted in a number of different ways: generically, as in European languages, as indefinites, as mass terms, and as definites. This dissertation will be concerned only with the indefinite and definite readings. Kurafuji (1999) goes into the semantics of these two readings in some detail, showing how the different readings can be inter-defined using Chierchia’s system of type-shifting operators. The reader is referred to this work for the details.



In this dissertation, we need to be concerned with the semantics of bare nominals only insofar as the modal subordination examples to be considered have in principle multiple readings. Consider for instance the example in (3.1):

- (3.1) inu-ga hasit-tei-ta  
 dog-NOM run-IMP-PST  
 ‘The dog was running.’  
 ‘The dogs were running.’  
 ‘A dog was running.’  
 ‘Some dogs were running.’  
 ‘Dogs were running.’

In some cases, this kind of underspecification between several readings of the nominals<sup>2</sup> is made determinate by subsequent discourse. But in the cases of intersentential anaphora we are concerned with, although the kind reading will be ‘weeded out’ by continuations like *It/They ate some meat*, both the definite and indefinite readings remain salient. When considering modal subordination, the Japanese-speaking reader should take care to interpret the nominals indefinitely.<sup>3</sup>

### 3.2 Modal Expressions in Japanese

The primary goal of this section is to set the stage for considering how modal subordination phenomena are realized in Japanese by providing an analysis of three Japanese modal expressions: *kamosirenai*, *hazu-da*, and *nitigainai*. All of these expressions appear sentence-finally, as shown by the examples.

- (3.2) a. *Kamosirenai* ◇:

neko-ga sakana-o taberu kamosirenai  
 cat-NOM fish-ACC eat might

---

<sup>2</sup>Or, possibly, true ambiguity; opinions differ on this point.

<sup>3</sup>Number is not an issue; singular or plural indefinite readings can be selected as desired, as long as the subsequent pronouns are interpreted in the same way.

‘A cat might eat the fish.’

b. *Hazu-da* □:

neko-ga sakana-o taberu hazu-da  
cat-NOM fish-ACC eat must-COP

‘A cat will (definitely) eat the fish.’

c. *Nitigainai* □:

neko-ga sakana-o taberu nitigainai  
cat-NOM fish-ACC eat must

‘A cat will (definitely) eat the fish.’

Two of these modals, *kamosirenai* and *nitigainai*, are morphologically complex, though the sequences seem to be largely grammaticalized.

(3.3) a. *ka-mo-si-re-na-i*: Q-also-know-be.able.to-NEG-PRES

b. *ni-tigai-na-i*: DAT-wrong-NEG-PRES

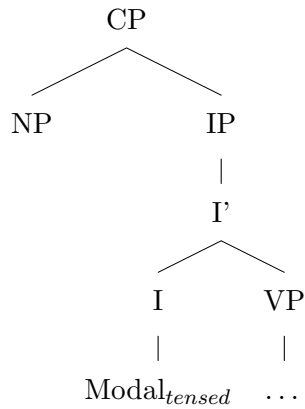
In addition, since *hazu* is grammatically a nominal expression, it must appear with the copula *da*. I do not consider instances of *hazu* in which it does not take a propositional complement, such as this one:

(3.4) *sonna hazu-ga nai*  
that.sort.of HAZU-NOM NEG-PRES

‘That can’t be right.’

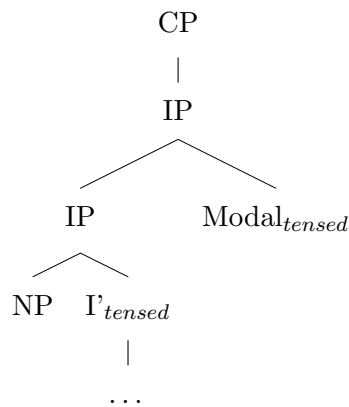
It’s very hard to find a good English equivalent of non-complement taking *hazu*. See Hirovani (1996) for more discussion of these uses of *hazu*.

Since these expressions take sentential complements, the range of tense possibilities is larger than that for English modals. English modal auxiliaries take tenseless VPs as complement, and so appear in the following configuration. I use a simplified tree representation, ignoring complexities about tense placement and movement that are irrelevant for my purposes here.



Therefore, only this single tense must be taken into consideration when thinking about the interaction of tense with modals, which is quite complex (cf. Condoravdi 2002; Kaufmann 2004a).

In contrast to this (relatively) simple picture, Japanese sentences with modals have two tense positions. I will refer to the position of tense in the embedded sentence as *internal tense* and the tense position on the modal as *external tense*. It is nontrivial to determine the exact syntactic position of the modals; I will not be able to carry out this project here. They contain a tense position so they must at least contain a TP; also they do not seem to embed complementizers and so can be taken to take IP complements. The following tree schematically illustrates the general situation, but I make no claims about the accuracy of the node labels.



This difference between English and Japanese, as we will see, affects possible interpretations of the modals, though I will not be able to give a full characterization of the interaction between tense and modals in this dissertation. But first we need to consider their basic meanings.

### 3.2.1 *Kamosirenai, nitigainai* and *hazu*

*Kamosirenai* is very similar in meaning to English *might*. The necessity modals are more complicated in that they appear to have an evidential component. Johnson (2003) states that *hazu* is used when the speaker has good evidence for the claim being made, while *nitigainai* is associated with conclusions obtained by inference. Some support for this claim is provided by the following minimal pair (mine; thanks also to Junko Shimoyama). In these examples, the speaker is making a prediction about the weather, something about which most people cannot be assumed to have reliable evidence. However, when the sentence is produced by someone who has the capacity to interpret certain sensory input as direct evidence for how the weather will go later, speakers are inclined to accept use of *hazu*. These examples show that the felicity of *hazu* involves the reliability of the evidence the speaker has available—but also that the reliability of this evidence is judged by the interpreter.

(3.5) In null contexts:

- a. asita      ame-ga    furu nitigainai  
tomorrow rain-NOM fall must  
'Tomorrow it will rain.'
- b. # asita      ame-ga    furu hazu da  
tomorrow rain-NOM fall must COP  
'Tomorrow it will rain.'

(3.6) Context: speaker is a 75-year-old farmer who can invariably predict the next day's weather from the look of the sky on the previous evening. Then:

- a. asita      ame-ga      furu nitigainai  
tomorrow rain-NOM fall must  
‘Tomorrow it will rain.’
- b. asita      ame-ga      furu hazu da  
tomorrow rain-NOM fall must COP  
‘Tomorrow it will rain.’

This fact makes it look very much like *hazu* is at least in part an evidential (cf. the *best possible grounds for assertion* needed for use of the Quechua evidential clitic *-mi* (Faller, 2002)). We will discuss what this notion amounts to further in a later section.

Some additional support for this claim, syntactic and semantic, is provided by the following facts.

First, *hazu* seems to compete with evidentials for syntactic position, or perhaps is semantically incompatible with them due to redundancy. *Rasii* in this example is an evidential indicating hearsay. This judgement is reported by Moriyama (2001).<sup>4</sup>

- (3.7) a. ame-ga      hidoi node      siai-ga      tyuusi-ni naru      nitigainai  
rain-NOM bad because match-NOM stop-DAT become MUST  
‘Because the rain is bad, the match will be cancelled.’
- b. ? ame-ga      hidoi node      siai-ga      tyuusi-ni naru      hazu-da  
rain-NOM bad because match-NOM stop-DAT become MUST-COP  
‘Because the rain is bad, the match will be cancelled.’
- c. \* ame-ga      hidoi node      siai-ga      tyuusi-ni naru      rasii  
rain-NOM bad because match-NOM stop-DAT become EVID  
‘Because the rain is bad, the match will supposedly be cancelled.’

---

<sup>4</sup>I do not share this judgement, and neither do most native speakers I have consulted, suggesting that this may not be the strongest evidence. I reproduce it here because it shows that this kind of incompatibility appears at least in some dialects of Japanese.

Next, it is odd to use *hazu* in sentences that express the speaker’s certainty based on inferencing (example from Moriyama 2001). Here, use of *nitigainai* is preferred.

- (3.8) a. kare-wa sootoo nemu-soo da. sakuya tetuya sita nitigainai  
 he-TOP very sleepy-looks COP. last.night all-nighter did MUST  
 ‘He looks very sleepy. He must have pulled an all-nighter last night.’
- b. kare-wa sootoo nemu-soo da. # sakuya tetuya sita  
 he-TOP very sleepy-looks COP. last.night all-nighter did  
 hazu-da  
 MUST-COP  
 ‘He looks very sleepy. He must have pulled an all-nighter last night.’

In this aspect *hazu* is a little bit like *must*. To paraphrase Palmer (2001):

*Must* is used “on the basis of evidence, e.g. that the office lights are on, that he is not at home, etc.” (for *John must be in his office*), and is used only when the deduction is emphasized.

Another interesting difference between the two  $\square$  modals is that *hazu* produces a counterfactual or doubting flavor when used in lawlike statements, but *nitigainai* does not:

- (3.9) a. 2 tasu 2 wa 4 ni naru nitigainai  
 2 added.to 2 TOP 4 to become must  
 ‘2 plus 2 must be 4.’
- b. # 2 tasu 2 wa 4 ni naru hazu da  
 2 added.to 2 TOP 4 to become must COP  
 ‘2 plus 2 should be 4 (, but ...).’

In (3.9b), the impression is that either the speaker doesn’t really believe that  $2+2=4$ , or that he tried adding 2 and 2 and came out with something else, and is commenting on that fact (i.e. in a discourse like ‘Hmm, that’s odd. (3.9b).’).

The implausibility of these two situations makes (3.9b) pragmatically rather weird. Once again there does seem to be this use with *must* in English as in the following example:

(3.10) My keys must be somewhere in this room (said when I haven't found them after quite a bit of searching).

I think the right explanation of this effect should go as follows. Assume, as seems correct based on the evidence presented above, that use of *hazu* implies that the speaker has direct evidence for his claim, due to the evidential content of *hazu*. But then the speaker's use of the modal/evidential implies that he thinks the facts are open to doubt, for why else should he use the evidential (given that, unlike many languages (Palmer, 2001), there is no grammatical requirement for doing so)? This kind of Gricean reasoning on the part of an interpreter leads to the conclusion that there must have been *some* reason for this choice. The interpreter then considers some possible explanations for why the evidential was used: perhaps the speaker supposes that the hearer won't believe what he is saying, or himself has some doubt about the truth of the proposition despite all the evidence pointing to it, or perhaps despite all the evidence something has gone wrong with a calculation. It's not entirely clear what the conclusion of the interpreter should be. But I think that this indeterminacy fits with the kind of weirdness these examples exhibit: it's not obvious exactly what interpretation we should come up with, but it is clear that there is a mismatch between the speaker's beliefs and what we otherwise know about the world.

### 3.2.2 Complications on counterfactuality

There are some interesting facts about counterfactual interpretation with these Japanese modals, which, however, are beyond the scope of this dissertation. I will limit myself to some brief comments. Past tense in the complement of modal verbs

in English can induce counterfactual interpretations when the modals are epistemic (Condoravdi 2003 and many others). We need to use the perfect for this.

- (3.11)a. He must/might/should come tomorrow. (epistemic)  
 b. He must/might/should have come yesterday. (epistemic/counterfactual)

The Japanese case is more complex due to the presence of two distinct locations for tense: the two tense placements affect the availability of CF readings, as does the particular modal used. Although all the modals considered are epistemic, the availability of counterfactual readings is not identical across them. I rely partly on Johnson (2003) for judgements.

The  $\diamond$  modal *kamosirenai* gets a CF reading only when past tense is placed on the modal (i.e. when the tense is external), not in the complement.<sup>5</sup> However, an epistemic reading is present even when external past tense is used.

- (3.12)a. *neko-ga sakana-o tabe-ta kamosirenai*  
 cat-NOM fish-ACC eat-PST might  
 ‘The cat might have eaten the fish.’ (epistemic only)  
 b. *neko-ga sakana-o tabe-ru kamosirenakatta*  
 cat-NOM fish-ACC eat-NPST might  
 ‘The cat might have eaten the fish.’ (epistemic/counterfactual)

The  $\square$  modal *hazu* is different in that use of external past tense forces a counterfactual interpretation, so no epistemic reading exists with external past tense, while internal past tense is associated exclusively with an epistemic reading:

- (3.13)a. *neko-ga sakana-o tabe-ta hazu da*  
 cat-NOM fish-ACC eat-PST must COP.NPST  
 ‘The cat must have eaten the fish.’ (epistemic only)

---

<sup>5</sup>The judgement on (3.12b) reported here differs from Johnson’s, who finds only an epistemic reading available.



- b. neko-ga sakana-o tabe-ru hazu datta  
 cat-NOM fish-ACC eat-NPST must COP.PST  
 ‘The cat must have eaten the fish.’ (counterfactual only)

However, use of either internal or external past tense with the  $\square$  modal *nitigainai* does not allow for counterfactual readings:

- (3.14)a. neko-ga sakana-o tabe-ta nitigaina-i  
 cat-NOM fish-ACC eat-PST must-NPST  
 ‘The cat must have eaten the fish.’ (epistemic only)
- b. neko-ga sakana-o tabe-ru nitigaina-katta  
 cat-NOM fish-ACC eat-NPST must-PST  
 ‘The cat must have eaten the fish.’ (epistemic only)

The question now is whether these facts should be given a purely semantic explanation or one that also involves syntax (cf. the work of Iatridou (2000), *i.a.*). The fact that different modals have distinct interpretations suggest that the primary factors at work are semantic; it seems unlikely that these modals introduce different syntactic structures. But, if one adopts syntactic proposals by e.g. Cinque (1999) and assumes that the Japanese modals are associated with different evidential content, different syntactic structures may become available. The reason is that Cinque assumes that the presence of evidential elements makes an additional maximal projection, EvidP, available; it may be that this projection can be associated with null operators in such a way as to make the desired counterfactual readings available. As these issues are beyond what I can go into here, I will not attempt to resolve this question in the present work, instead moving on to consider how the evidential component of the modals should be analyzed.

### 3.3 Past treatments of evidentials: Faller 2002

The best-known formal treatment of evidential constructions is that of Faller (2002). Cuzco Quechua has several enclitic suffixes that mark evidentiality or the nature of

the speaker's justification for making the claim. Faller analyzes three suffixes in detail:

- *-Mi*: the speaker has direct (perceptual) evidence for the claim.
- *-Si*: the speaker heard the information expressed in the claim from someone else.
- *-Chá*: the speaker's background knowledge, plus inferencing, leads him to believe the information in the claim true.

Some examples follow (from Faller 2002, p. 3). I have modified the gloss Faller provides for (3.15c) to reflect the modal meaning given in Faller's semantics.<sup>6</sup>

- (3.15)a. Para-sha-n-mi  
rain-PROG-3-MI  
'It is raining. + speaker sees that it is raining'
- b. para-sha-n-si  
rain-PROG-3-SI  
'It is raining. + speaker was told that it is raining'
- c. para-sha-n-chá  
rain-PROG-3-CHÁ  
'It must be raining. + speaker conjectures that it is raining based on some sort of inferential evidence'

The enclitics *-mi* and *-chá* are relevant for our discussion of *hazu* and *niti-gainai*. The Japanese expression *soo+COP*, which, like the modals I discuss, appears sentence-finally and behaves as a propositional modifier, also appears to have a semantics similar to that of enclitic *-si*. I will not discuss it in this dissertation, though I think that the treatment of *hazu* to be presented below will generalize well.

---

<sup>6</sup>Faller translates the sentence as "It is raining' and the speaker conjectures that it is raining." This translation seems to us infelicitous, in a similar way to the well-known Veltman example '*It is not raining. It might be raining*' (Veltman, 1996) discussed in chapter 1. This infelicity suggests that making a conjecture about the truth of  $\varphi$  is incompatible with knowing that it is true.

Faller uses Vanderveken’s (1990) speech act theory for her analysis. Vanderveken’s theory assigns speech acts three preconditions for successful performance. Faller takes evidentials to introduce additional content into the set of preconditions.

- Propositional content: restricted in instances such as promises.
- ILL: Illocutionary force (*assertion* for all examples we consider).
- SINC: sincerity conditions on successful performance of the SA. For assertions, that  $Bel(s, p)$  holds—that the speaker believes the content of the assertion.

In large part, the focus of Faller’s analysis of *-mi* and *chá* is on the sincerity conditions for the assertion. Essentially, *-mi* adds an additional sincerity condition to the assertion, that  $Bpg(s, p)$ . The formula  $Bpg(s, p)$  means that the speaker has the best possible grounds for believing  $p$ . Faller does not attempt to make this notion precise, noting only that for externally visible events  $Bpg$  will ordinarily be sensory evidence, while for reports of people’s intentions or attitudes hearsay evidence will often be enough.

Faller analyzes *-chá* as being simultaneously modal and evidential. As a result, the propositional content  $p$  is mapped to  $\diamond p$ , as is the corresponding belief object  $Bel(s, p)$  in SINC. The condition  $Rea(s, Bel(s, \diamond p))$  is also added to SINC.  $Rea(s, Bel(s, \diamond p))$  indicates that the speaker’s belief in the possibility of  $p$  follows from his own reasoning/inference.

While I believe that Faller’s analysis of evidentials could also apply to the Japanese case, I will develop an alternative since we take the evidential components of the modals to be presupposed. Further, it’s not at all clear how sincerity conditions might interact with implicatures and the modal semantics. The Japanese data on modal subordination indicates that there are interactions and that they are subtle. Modern accounts of presupposition have investigated the interactions between presupposition and implicature and I hope to use some of that here, another reason

for developing a new account.

We now turn to data on Japanese modal subordination. Virtually all researchers on the topic have considered only data from English and German, and to a lesser extent French (with the notable exception of Kurafuji (1999), who touches on related issues with Japanese bathroom sentences, which I will discuss briefly below). It turns out that the facts in (some) non-Indo-European languages are quite different. In this chapter, I will present new data on modal subordination in Japanese, in which the realization of modal subordination shows interesting and independent differences from the English/German case, and show how these differences can be linked to the resources each language has for expressing different types of modality; it will also be shown that pragmatic factors, as expressed in some cases by discourse particles, play a role in licensing modal subordination as well. Finally, I will show how the differences can be accounted for within a formal theory of modal subordination that uses the combination of Asher & McCready's (2004) notion of information states and SDRT discussed in the previous chapter.

### 3.4 Modal subordination in Japanese

Modal subordination in Japanese turns out to be basically very different from the English case. Speakers seem to vary a good deal as to which cases of modal subordination are found to be felicitous and which are not; I will give what I think is the right explanation of this fact below. Still, one result is immediate. The basic translation of the Roberts example (2.5a) into Japanese is infelicitous with a covert pronoun or the pseudo-demonstrative *soitu* (see Hoji et al. 2003 for more on the Japanese demonstrative system). Just as with English *will*, the futurate or pseudo-modal interpretation available for the nonpast tense is not enough to rescue the discourse:

(3.16)ookami-ga kuru kamosirenai. #  $\emptyset$ /soitu anata-o taberu nitigainai.  
 wolf-NOM come might  $\emptyset$ /that-guy you-ACC eat surely  
 ‘A wolf<sub>i</sub> might come in. It<sub>i</sub> would eat you first.’

This discourse, however, became perfectly acceptable, when I introduced a particular context in which there was *evidence* that the wolf would eat you first. The introduction of such evidence also made the *nitigainai* . . . *nitigainai* story, which was judged largely unacceptable without this context, completely acceptable. I asked speakers to consider the examples

in a situation where the hearer (you) knows the following facts: a) you are on an island that is having a particularly harsh winter, b) the wolves in the area are ravenously hungry and c) you are sitting closest to the door, so you are the first person any wolf coming in will encounter.

This scenario will be referred to as ‘bare2’ in what follows, to distinguish it from ‘bare1’, where no additional context was introduced.

Somewhat marginal but still accepted by more speakers than not in my survey is the variation of our story where the order of modals is reversed: that is,  $\Box\Diamond(\forall\exists)$  rather than  $\Diamond\Box(\exists\forall)$ :

(3.17)ookami-ga kuru nitigainai. #  $\emptyset$ /soitu anata-o taberu kamosirenai.  
 wolf-NOM come surely  $\emptyset$ /that-guy you-ACC eat might  
 ‘A wolf<sub>i</sub> will / must surely/ should come in. It<sub>i</sub> might eat you.’

If we translated *nitigainai* by *would*, the result wouldn’t sound that good in English either. *would* requires some sort of situation affecting the epistemic possibilities to depend on. Nevertheless there are clear  $\Box\Diamond$  sequences that are perfectly acceptable in English. Here’s one from the web:

(3.18) The orbit of the asteroid, called 1950 DA, has been observed over a time frame spanning five decades. This allowed the researchers to project its approximate path farther into the future than is possible with most asteroids. The result: 1950 DA currently has at most a 1-in-300 chance of hitting Earth on March 16, 2880.

Because 1950 DA is large – more than 1 kilometer (0.6 miles) across – the consequences would be grave and global. Clouds of debris would create a multi-year winter that would kill off many species and might even threaten civilization. (from An Asteroid might hit Earth in 2880 R Britt at space.com)

Note that the epistemic possibility introduced by *might* clearly depends on the *would* modality in this example.

When *nitigainai* is replaced by *hazu* in (3.17) the result is very marginal. This is quite different from *must*, which seems to be *hazu*'s closest English equivalent. I find the translation of (3.17) acceptable with *must*, and have found that *must* supports modal subordination fine when the first sentence contains a stative:

(3.19) Lizzie must have made some friends now in Salt Lake. She might be going climbing with them this weekend.

(3.20) Lizzie might have found a route she likes at that cliff. It must be pretty hard.

Of all the standard modal subordination patterns that I looked at, the only one that was judged acceptable by almost all speakers in an out of the blue context was the sequence of two *might* modals as in:

(3.21) ookami-ga kuru kamosirenai.  $\emptyset$ /soitu anata-o taberu kamosirenai.  
 wolf-NOM come surely  $\emptyset$ /that-guy you-ACC eat might  
 ‘A wolf<sub>i</sub> might come in. It<sub>i</sub> might eat you.’

All the other modal variations on our discourse were rejected by more participants than not (though the survey indicates a large variation of acceptability among the

speakers we surveyed).

### 3.4.1 Discourse markers and conditionals

Interestingly, the standard  $\diamond\Box$  pattern of modal subordination when *nitigainai* is chosen to express the  $\Box$  operator is felicitous when licensed by discourse markers (3.22a) or conditional clauses (3.22b), though the pattern nevertheless remains bad when *hazu* is used to express the  $\Box$  operator, as shown in (3.23). The particular conditional I used was *sositara*, morphologically *soo-si-tara* ‘that-do-COND’. So it includes a specifically anaphoric element. The discourse marker I checked in most detail, *so-si-te* ‘that-do-CONT’, is similar. I will show below that the anaphoric nature of these elements influences the felicity of the examples.

- (3.22)a. ookami-ga kuru kamosirenai. sosite  $\emptyset$ /soitu anata-o taberu  
 wolf-NOM come might then  $\emptyset$ /that-guy you-ACC eat  
 nitigainai.  
 surely  
 ‘A wolf<sub>i</sub> might come in. Then it<sub>i</sub> would eat you.’
- b. ookami-ga kuru kamosirenai. mosi  $\emptyset$  kitara  $\emptyset$ /soitu  
 wolf-NOM come might if  $\emptyset$  came-COND  $\emptyset$ /that-guy  
 anata-o taberu nitigainai.  
 you-ACC eat surely  
 ‘A wolf<sub>i</sub> might come in. If (one) did, it<sub>i</sub> would eat you.’
- (3.23)a. ookami-ga kuru kamosirenai. # sosite  $\emptyset$ /soitu anata-o taberu  
 wolf-NOM come might then  $\emptyset$ /that-guy you-ACC eat  
 hazu da.  
 surely COP  
 ‘A wolf<sub>i</sub> might come in. Then it<sub>i</sub> would eat you.’
- b. ookami-ga kuru kamosirenai. # mosi  $\emptyset$  kitara  $\emptyset$ /soitu  
 wolf-NOM come might if  $\emptyset$  came-COND  $\emptyset$ /that-guy  
 anata-o taberu hazu da.  
 you-ACC eat surely COP  
 ‘A wolf<sub>i</sub> might come in. If (one) did, it<sub>i</sub> would eat you.’

Use of *sosite* indicates that the discourse relations Elaboration or Narration/Result (here the latter) hold between the marked constituent  $\alpha$  and some previous constituent in the discourse. Note also the anaphoric relation between the covert pronoun in the conditional restrictor and the indefinite *ookami* ‘wolf’ in the first sentence.

### 3.4.2 Modal subordination with emphatics

Modal subordination is possible even without a modal when certain sentence-final emphatic particles are used, such as *yo*. Note that the tense of the second sentence is nonpast, meaning that a futurate interpretation is available (example due to Ken-ichiro Shirai).

- (3.24) *ookami-ga kuru kamosirenai.  $\emptyset$ /soitu anata-o taberu yo.*  
 wolf-NOM come might  $\emptyset$ /that-guy you-ACC eat YO  
 ‘A wolf<sub>i</sub> might come in. It<sub>i</sub> (will) eat you, man (rough gloss).’

The function of *yo* is still not well understood, but generally speaking seems to mark a proposition that the speaker takes to be either new or important information for the hearer (Suzuki Kose, 1997). Here it appears to indicate to the hearer that the sentence in its scope is a warning/caution, and so has special relevance for the hearer. The sentence with *yo* is used with a special intonation, but this intonation cannot license subordination by itself, showing that the particle serves as licenser. I do not discuss the role of intonation in this dissertation, focusing instead simply on the role of *yo*. A detailed discussion and analysis of *yo* will be presented in the next chapter.

To summarize, modal subordination in Japanese is much more restricted than in English. The standard pattern requires an overt marker of subordination for the right epistemic possibility to be picked up. *Hazu* doesn’t support modal subordination at all at least not in the standard cases. *Nitigainai* can support



modal subordination only marginally in out of the blue contexts, though it works much better with discourse particles or conditionals.

I also note that some speakers find a distinction between overt and covert pronouns; for a minority of speakers, null pronouns are better than the overt demonstrative *sono ookami* ‘that wolf’ or *soitu* ‘that thing’. I will not consider this contrast in much detail for two reasons. First, it holds only for a small minority of speakers—in fact, only two of the speakers I consulted found any contrast here. Second, the overt forms may be independently bad. A number of speakers I consulted found examples with overt demonstratives completely out; so the contrast here may lie in independent constraints on binding which are only indirectly related to the modal subordination facts which are my main focus. In this context it will be useful to consider the discussion of Kurafuji (1998), who considers examples in some respects similar to the ones above. In particular, he considers Japanese versions of ‘bathroom sentences’ like that in (3.25a), which is modeled on an example in Roberts (1989) due originally to Barbara Partee. Kurafuji’s Japanese equivalents are shown in (3.25b) and (3.25c). The former has no conditional clause, while the latter does.

(3.25)a. Morrill Hall does not have a bathroom or it’s in a funny place.(Kurafuji, 1998)

b. kono tatemono ni toire-ga nai ka,  $\emptyset$ /?sore-ga henna tokoro ni  
 this building in toilet-NOM not or, it-NOM strange place in  
 aru ka-no dochira-ka desu  
 exist or-COP which-Q COP  
 ‘It is the case that either there is not a bathroom in this building or that  
 it is in a funny place.’

c. kono tatemono ni toire-ga nai ka, moshi  $\emptyset$ /\*sore-ga/toire-ga  
 this building in toilet-NOM not or, if it-NOM/toilet-NOM  
 aru nara,  $\emptyset$ /sore-ga henna tokoro ni aru ka-no dochira-ka desu  
 exists Cond, it-NOM strange place in exist or-COP which-Q COP

‘It is the case that either there is not a bathroom in this building or that it is in a funny place.’

Kurafuji draws several conclusions from these examples. The first is that a deep difference exists between overt and null pronouns in discourse: overt pronouns must be dynamically bound in the sense of dynamic semantics, and so may appear only in contexts where they have accessible antecedents in the DRT sense, while null pronouns can be interpreted as E-type and so may appear in contexts where no antecedent is accessible.<sup>7</sup> I find this conclusion somewhat premature. While I agree that a difference exists between overt and null pronouns, I do not think that Kurafuji’s characterization of this difference is the right one. For one thing, this analysis predicts that null pronouns in modally subordinated contexts will be good *without* an overt conditional clause. The data above falsifies this prediction.<sup>8</sup>

The other fact brought out by Kurafuji’s examples, that bathroom sentences also require an overt conditional clause to license anaphora, is undeniable. In his examples, however, he includes an indefinite in the conditional clause, thus allowing the anaphoric dependency to be unrelated to the disjunction itself. On this point, his examples are fundamentally different from the modal subordination cases.

But the most important point about the null-overt contrast noted by Kurafuji for our purposes is that it does not hold for all speakers. Kurafuji (1999:109-112) separates Japanese speakers into ‘cooperative’ and ‘non-cooperative’ hearers; the first type are willing to do some accommodation to make anaphora work out and the second type aren’t. Only the second type have the null-overt contrast; for the cooperative hearers, the effect of the contrast is eliminated by use of accommodation.

---

<sup>7</sup>Kurafuji presents this distinction as evidence for the ‘distribution of labor’ theory of Chierchia (1995).

<sup>8</sup>Kurafuji (p.c.) suggests that the impossibility of modal subordination in the *kamosirenai-hazu* case may be due to some sort of presupposition failure. I think this is right, and that the presupposition failure in question is due to the evidential component of *hazu*. I think though that Kurafuji’s idea is that the problem lies in the existential vs. universal nature of *kamosirenai* and *hazu*. But this can’t be right, for modal subordination is also bad when two universal operators are used: e.g. *hazu* followed by *nitigainai*, or *nitigainai* followed by *hazu*.

In the modal subordination cases, a similar effect seems to come into play. The difference is that while in Kurafuji’s bathroom sentence cases, most speakers get the null/overt contrast, in the modal subordination cases most speakers do not. I do not presently understand the reason for this difference.

### 3.4.3 Excursus: Uniqueness and null pronouns

I want to move away from the modal subordination question for a moment to discuss one prediction of the Kurafuji account that runs into empirical difficulties. Kurafuji uses different semantic mechanisms for the binding of overt and null pronouns: null pronouns are E-type, while overt pronouns are dynamically bound. His bathroom examples, repeated here as (3.26), seem to bear this out: dynamic binding is impossible in bathroom contexts and overt pronouns are odd there, so if such pronouns are dynamically bound the facts are explained. I do not wish to attack this portion of the Kurafuji account here, but instead to focus on another prediction that stems from the analysis of null pronouns as (optionally) E-type.

- (3.26)a. Morrill Hall does not have a bathroom or it’s in a funny place.(Kurafuji, 1998)
- b. kono tatemono ni toire-ga nai ka,  $\emptyset$ /??sore-ga henna tokoro ni  
 this building in toilet-NOM not or, it-NOM strange place in  
 aru ka-no dochira-ka desu  
 exist or-COP which-Q COP  
 ‘It is the case that either there is not a bathroom in this building or that  
 it is in a funny place.’
- c. kono tatemono ni toire-ga nai ka, moshi  $\emptyset$ /\*sore-ga/toire-ga  
 this building in toilet-NOM not or, if it-NOM/toilet-NOM  
 aru nara,  $\emptyset$ /sore-ga henna tokoro ni aru ka-no dochira-ka desu  
 exists Cond, it-NOM strange place in exist or-COP which-Q COP  
 ‘It is the case that either there is not a bathroom in this building or that  
 it is in a funny place.’

E-type pronouns come with uniqueness presuppositions because of their status as covert definite descriptions (Heim 1990; Neale 1990; Elbourne 2001, among many others). If null pronouns must be interpreted as E-type in cases in which their antecedents are inaccessible, then in such contexts they will presuppose the existence of a unique individual satisfying the antecedent in the utterance context.<sup>9</sup> And indeed in sentences like those in (3.26) the bathroom in question does seem to be unique. But this is not always the case.

Consider the following dialogue, in which the antecedent *toire* ‘bathroom’ is inaccessible (in dynamic semantic terms) due to being in the scope of an attitude verb.

(3.27) Two people are on the fourth floor of a 10-story building.

- (3.28)a. A: kono tatemono ni toire-ga aru kadooka wakarimasu ka?  
           this building in bathroom-NOM exist if know Q  
           ‘Do you know if there is a bathroom in this building or not?’
- b. B: hai, gokai ni  $\emptyset$  arimasu yo  
       yes, 5th-floor on exists YO  
       ‘Yes, there’s one on the fifth floor.’

In B’s answer, the null pronoun depends on the NP *toire* in A’s question for its meaning. And clearly, on Kurafuji’s account, since *toire* is in the scope of an attitude the null pronoun must be interpreted as an E-type pronoun, meaning that a uniqueness presupposition is present. But there does not seem to be a need for the fifth floor bathroom to be the only one in the building; there could easily be several bathrooms in the building, of which the one on the fifth floor is just the most convenient considering the location of the conversation. These facts appear to be

---

<sup>9</sup>I paint a fairly broad picture of the uniqueness requirement. Actually there is a debate in the literature about the exact status of this requirement, particularly on what exactly is needed for it to be satisfied. I will abstract away from the details here.

fairly general across languages with null pronouns: Chinese and Hindi, for example, show similar effects.<sup>1011</sup>

What is shown by examples like these? There are several possibilities. The first and crudest is that Kurafuji's analysis is simply wrong. I'm not sure that the data justifies this extreme conclusion; nonetheless I will treat null pronouns as dynamically bound throughout the dissertation, regardless of antecedent accessibility, because of worries about the issue. More likely is the hypothesis that pragmatic issues constrain the interpretation of pronouns. A cooperative listener, on being asked A's question, is unlikely to assume that A is wondering about the existence of bathrooms in general, but instead to guess that A has some pressing need for a bathroom and to direct him to the closest one. In examples like (3.26), on the other hand, attention is being drawn to whether there is any bathroom at all in Morrill Hall, an entire building. If this is right, then speaker reasoning about hearer intentions plays a role in the interpretation of null pronouns. One could implement this idea using pragmatic reasoning directly, or by allowing it to influence the parameters (e.g. the 'minimal situations' of Heim or Elbourne) in which the uniqueness requirement must be satisfied. A full answer to this question, however, is beyond the scope of this dissertation.

I now turn to my analysis of the modal subordination facts.

---

<sup>10</sup>Thanks to Henrietta Yang and Veneeta Dayal for judgements on these languages.

<sup>11</sup>Some readers may wonder whether the lack of uniqueness effects or maximality seen here are the result of the antecedent appearing in an existential construction. The short answer is: yes, probably so. Still, this doesn't eliminate the force of the example, given that English pronouns in similar contexts *do* still exhibit uniqueness effects:

- A: Do you know if there is *a bathroom* in this building?
- B: Yes, *it* is on the fifth floor.

Here *it* clearly denotes the unique bathroom in the building.

### 3.5 Modal Semantics

What has an adequate account of the Japanese facts got to have? It first has to give a way of understanding the differences between the modals in Japanese, both in terms of their subsentential behavior and in terms of the way they interact with modal subordination. Second, it has to analyze the semantic mechanism at work in the felicitous examples of modal subordination, both in Japanese and in the better-studied case of English; as a methodological principle, any account that means to handle new data should also extend to the cases dealt with by previous accounts. More concretely, if an account given for Japanese does not cover the English cases, it can be assumed to be inadequate. Finally, one would like an account of why it is necessary to overtly mark subordination in Japanese but not in English.

In English, *might* introduces new epistemic possibilities that can be picked up by other modal propositions introduced later in the discourse. In Japanese, *kamosirenai* seems to work the same way. The  $\square$  modals are more complex. One clear observation is the marked difference in subordination behavior between *nitigainai* and *hazu* in the Japanese modal subordination patterns. Given the observations about the evidential content of *hazu*, we can explain that with the idea that there are conflicts between the evidentiality requirements on the modals and their use in subordinated contexts, at least in the bare cases. Conditionals and *sosite* can then be characterized as one means of producing a ‘link’ for evidentiality. It is well known that Japanese has grammaticized a number of linguistic phenomena that in European languages appear strictly through inferencing (e.g. *wa*-marking of topicality; Portner & Yabusita 1998). I hypothesize that this grammaticalization has also taken place at the level of discourse logical form, so that marking of discourse relations, attachment, etc. overtly is obligatory in certain circumstances. One area in which obligatory marking is found seems to be modally subordinate contexts. If this is correct, we have an explanation of why marking is necessary that fits into a

broader picture of crosslinguistic variation.

### 3.5.1 Modals and evidentiality

This section provides a semantics for the Japanese modals that, in conjunction with the modal semantics presented in chapter 2, accounts for the modal subordination facts.

The Japanese existential modal *kamosirenai* behaves similarly to its English counterpart with respect to both modal subordination and evidentiality. So I'll take both to have the same semantics. Let's now turn to a comparison of the universal or  $\square$  modals *would* at first glance appears to function as a simple test: if all the epistemic possibilities support  $\phi$ , then *would* $\phi$  is true; otherwise not. There is reason to question this simple semantics for *would*. In fact I want to argue that it has an evidential component as well. But it's difficult to see, and I myself didn't notice it until looking at the Japanese  $\square$  modalities. To get a feel for evidential requirements it's better first to look at *must* and the Japanese  $\square$  modalities. Recall Palmer's characterization of *must* as requiring some sort of evidence. We can see a reflection of this evidential requirement in the modal subordination facts. *Must* is good with stative but less good with event introducing VPs. *must* and *would* are not identical, as shown by the following examples.

- (3.29)a. Someone must be at the store now. He might be buying something.
- b. John might be at the store now. He must be buying a bottle of wine.
- c. John must be at the store now. He might go to the park next.
- d. John must go to the store now. He might go to the park next. (only a deontic reading for many speakers)

Statives are important especially for the first verb.

- Hypothesis: there is an evidential component to epistemic *must* (cf. the quote by Palmer) The evidential requirements of *must* cannot be very well satisfied except by present or past events (except for necessary truths—*2+2 must always = 4.*)

If this hypothesis is correct, given that event-denoting complements of epistemic modals are always interpreted as futurate in the absence of the perfect and that statives are interpretable as either present-oriented or futurate (Condoravdi 2002), we get an explanation for why an epistemic reading is unavailable in (3.29d).

The semantics for the Japanese universal modals clearly differs from the semantics of *would* as we've sketched it. And the modal subordination behavior confirms some important differences. Neither *hazu* nor *nitigainai* have a reading dependent upon a  $\diamond$  modality in out of the blue or null contexts, whereas *would* certainly does. In certain contexts, however, *nitigainai* does have a modally subordinate reading, though *hazu* does not. We predict modal subordination to fail for Japanese with this semantics, but not because of the difference in the modal meaning of the particles *hazu* and *nitigainai*. Rather, the infelicity of the modal subordinations comes from a failure of the evidential presuppositions of the Japanese.

Evidentials have not received much study until recently in formal semantics and pragmatics. I will treat the evidential components of the Japanese  $\square$  modalities as presuppositions, in contrast to Faller's analysis, which takes them to be conditions on speech acts. The data is complex and a larger survey needs to be conducted if the questions raised here are to be answered definitively.<sup>12</sup> But some very interesting facts and some intriguing questions already surface: why can the evidential presuppositions be apparently accommodated in the antecedent of a conditional (notice how *nitigainai-kamosirenai* and *hazu-kamosirenai* sequences are good

---

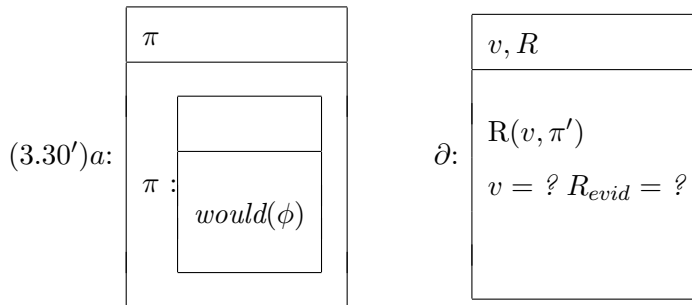
<sup>12</sup>I actually conducted the survey at Osaka University on 48 students there. Unfortunately, the results were not good; the students either didn't understand the (admittedly complex) task or else didn't take it seriously. Even the obviously infelicitous control examples were judged good by most of them. In the end, I had to throw the results out.



in the conditionals) and in the presence of *sosite* but not in the null context? Furthermore there arises a question about why the presupposition of *hazu* can't be at all accommodated in the consequents of conditionals but can be in conditional antecedents.

One thing that is apparent is that these modals have evidential presuppositions of differing strength. The evidential presuppositions of *nitigainai* are easily accommodated or bound in contexts where there is information sufficient, together with perhaps certain modal assumptions given by  $\diamond$  updates, to support the proposition under *nitigainai*'s scope. That seems to be the appropriate generalization of our data about the *kamosirenai ... nitigainai* in the “bare2” scenario where the relevant sort of evidence is supplied by the context (see the end of the chapter for the exact context provided).

(3.30) *nitigainai*  $\phi$



Exactly what kind of evidence is required for *nitigainai* is not totally clear but it appears that this evidence need not be perceptually given and could be just what one is told about the situation. When it is given as part of the context as in the “bare2” set of examples, the presupposition is satisfied and affects via our update rules all of the epistemic possibilities. When the epistemic possibilities are reset or such that they support other information that together with the evidence allows us to derive the proposition under the scope of *nitigainai*, then we have an acceptable discourse.

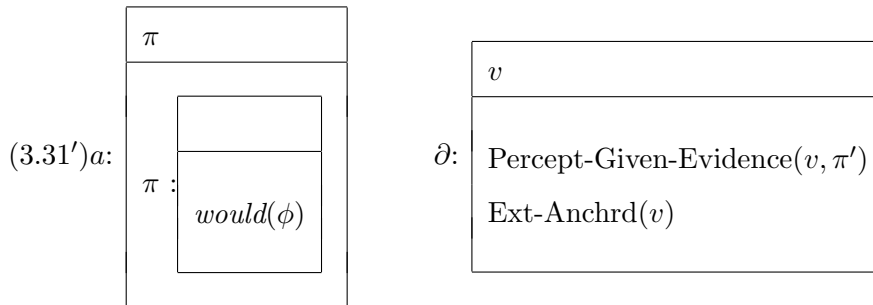
Nevertheless, it appears difficult for many Japanese speakers to accommodate this evidential presupposition, which I'll write for short as *∂nitigainaiϕ*. Exactly why that is isn't completely clear. Perhaps there is just less of a general willingness to accommodate presuppositions in Japanese. This claim should be tested carefully; but some suggestive evidence is provided by the study on bathroom sentences of Kurafuji (1999) and also by recent work on Japanese comparatives by Beck et al. (2004). Alternatively, one might guess that some sorts of evidential presuppositions can't be accommodated. But neither one of these explanations appears to be undeniably right. For it appears that *∂nitigainaiϕ* does get accommodated in the presence of a conditional or *sosite*. Unlike the “bare2” cases there is no binding here that's obviously given. But the “bare1” examples show that the presupposition cannot be simply accommodated in at the “top” or veridical level. So the puzzle about accommodation here has to do with discourse constituency or with the way discourse structure and dependencies interacts with evidential presupposition. I'll come back to this after looking at the presuppositions for *hazu*.

*Hazu* has a presupposition that the evidence is deictically given in the context (like the *-mi* particle of Quechua), i.e. the evidence is external and perceptible. Note however that what counts as good evidence is dependent on what the interpreter is willing to accept, which in turn depends on the context and on external factors and knowledge—as in the example with the farmer given previously, in which perceptual evidence for rain was sufficient to license *hazu* just in case the user of the evidential could be assumed to have the ability to ‘back up’ his assertion with additional facts about the situation. This variability is similar to that noted by Faller for Quechua *-mi*, which again brings out the similarity between the two.

This presupposition cannot be bound to anything other than some situation in the context (which I think of as historically extended back into the past—i.e. as a sequence of Kaplanian contexts rather than simply as consisting of a world and

some designated entities as in Kaplan 1989). The external anchoring device from DRT serves as a place holder for determining how this link to the context is made.

(3.31) *hazu* $\phi$



This evidential presupposition can't be bound in the “bare2” context, because the wolf situation isn't perceptually given. However, why can't it be accommodated? Are these sorts of presuppositions that don't accommodate well like the presupposition of *too* in English? The answer is probably not. For Japanese speakers *do* accommodate both the presuppositions of *hazu* and *nitigainai* in a one sentence use. But in the case of a two sentence discourse with two evidential presuppositions, we get a marginal result. This too suggests that we haven't gotten to the bottom of our story. Evidential presuppositions interact both with modals and with discourse structure in a very curious way.

One may wonder why I did not simply make use of Faller's semantics. The reason is simple. According to Faller, evidentials introduce conditions on speech acts; this means that they always project out from the sentence and take scope over any other operators. However, the Japanese modal subordination data related to conditionals and discourse particles suggests that, in the case of *nitigainai*, the evidential component of the modal's meaning does *not* always project out. Rather, it can be 'bound' if the right sort of information is present in the conditional antecedent or in a previous sentence (in the case of discourse particles). This behavior is much like that of presuppositions, as detailed in van der Sandt (1992) and Beaver (2002).

I conclude that an analysis in terms of presupposition is the right way to tackle the Japanese evidential facts. I do not know whether this story can carry over to the Quechua case, however, though I will explore one way this project might be carried out in the next subsection.

Now let us return to our main objective. Before tackling the details of the modal subordination part of our story, though, let's go back to *would*. Could English *would* be a pure epistemic modal, unlike any of the other modals we've surveyed? That would be odd and we have several bits of evidence to show this isn't so. First, stand alone uses of *would* like

(3.32) The bastard would do that.

imply at the very least that the speaker expected the untoward actions of the agent mentioned. It's only a small step to assume that these expectations represent the presence of certain sorts of evidence supporting the proposition within the scope of the modality. More tellingly is the inference from *might*  $\phi$  to *would*  $\phi$ . In our semantics, this inference is valid, and it also looks valid (depending on how you construe validity in the anaphoric framework) in the analyses of Frank and Roberts. But that isn't right. In fact if you hear a sequence like *might*  $\phi$  *would*  $\phi$ , it sounds like a Correction. It's clearly not a valid inference. What stops it from being a valid inference, I hypothesize, is the evidential presupposition of *would*  $\phi$ .  $\partial(\textit{would}\phi)$  conflicts with an implicature of *might* $\phi$ , which is that a stronger modality with a stronger evidential presupposition *doesn't* hold. There seems to be also a more general rule about *how* evidential presuppositions are to be accommodated. It follows the basic rule that 'just saying it doesn't make it so.' Evidential presuppositions must be accommodated *before* any modal updates, because the evidential requirement for *would* is required to be *actual* not just based on some epistemic possibility, and so cannot be satisfied by update with modals. Now if we attend to the inference from *might*  $\phi$  to *would*  $\phi$  we see immediately that in certain structures and at certain elements  $\epsilon$ ,  $\mathcal{E}(\epsilon)$

as well as  $\epsilon$  itself will not support  $\partial(\textit{would}\phi)$  and so the attempted accomodation will not yield a non-empty discourse update. I stipulate that if the presupposition is not bound or accommodated, then the inference cannot go through. Thus, the evidential presupposition of *would* plays an important role in distinguishing *would* from *might*.

This is the place to discuss a point in our semantics that may look problematic: the inference from *might*  $\phi$  to *would*  $\phi$ . Without further modification, this inference is valid, and it also looks valid (depending on how you construe validity in the anaphoric framework) in the analyses of Frank and Roberts. Now some speakers have the feeling that the assertion of *would*  $\phi$  after an assertion of *might*  $\phi$  (by the same speaker) is redundant. And such redundancy is a mark of entailment. But still one has qualms about the validity of this inference. For one thing, if you hear a sequence like *might*  $\phi$  *would*  $\phi$ , it sounds like some sort of a Correction. It's clearly not a valid inference. What stops it from being a valid inference, I hypothesize, is an evidential presupposition of *would*  $\phi$ , which I'll write as  $\partial(\textit{would}\phi)$ . There's a lot of evidence that modals in many languages have evidential presuppositions, something that will be investigated in detail in the next chapter. Such presuppositions help us explain our understanding of a *might*  $\phi$  *would*  $\phi$  sequence as a Correction, since  $\partial(\textit{would}\phi)$  conflicts with an implicature of *might* $\phi$ , which is that a stronger modality with a stronger evidential presupposition *doesn't* hold. We accommodate an evidential presupposition *before* any modal updates. This is because the evidential requirement for *would* is required to be *actual* not just based on some epistemic possibility. Now if we attend to the inference from *might*  $\phi$  to *would*  $\phi$  we see immediately that in certain structures and at certain elements  $\epsilon$ ,  $\mathcal{E}(\epsilon)$  as well as  $\epsilon$  itself will not support  $\partial(\textit{would}\phi)$  and so the attempted accomodation will not yield a non-empty discourse update. But if the presupposition is not bound or accommodated, then the inference cannot go through. Thus, the evidential presupposition of *would*

plays an important role in distinguishing *would* from *might*.

The basic route to an explanation of the Japanese modal subordination facts, then, is a consideration of the interaction of the evidential component of the modals with the semantics of the things that license modal subordination. I will argue that the licensers each serve in some way to provide a way to ‘bind’ the evidential presupposition associated with the modal. Before going into this, however, I will make a brief return to the Quechua evidentials.

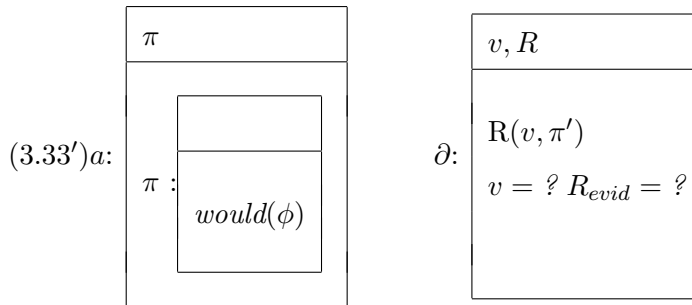
### 3.5.2 Excursus: Quechua evidentials

In this section I want to sketch how the ideas developed for representing the evidential component of Japanese modals can be used to analyze the Quechua evidentials discussed by Faller (2002). The three evidentials in question are shown below.

- *-Mi*: the speaker has direct (perceptual) evidence for the claim.
- *-Si*: the speaker heard the information expressed in the claim from someone else.
- *-Chá*: the speaker’s background knowledge, plus inferencing, leads him to believe the information in the claim true.

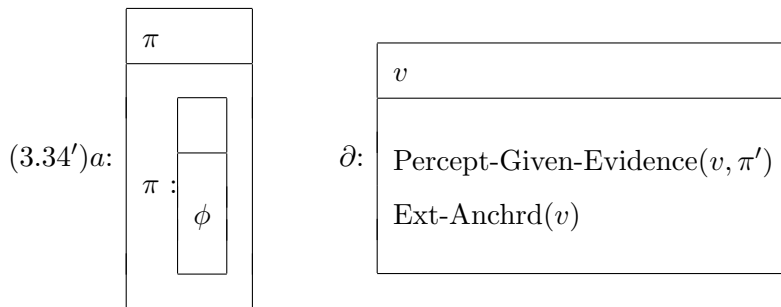
As I showed previously, *-mi* is exactly analogous to Japanese *hazu*, and *-chá* behaves very similarly to *nitigainai*. The main difference between the two types is that Quechua *-mi* and *-si* do not involve a modal component. Thus we can construct a semantics for these evidentials on the model of what we did for the Japanese modals, as follows. I start with *-chá*, which does have a modal component, and so is very similar to *nitigainai*.

(3.33) *cha*ϕ



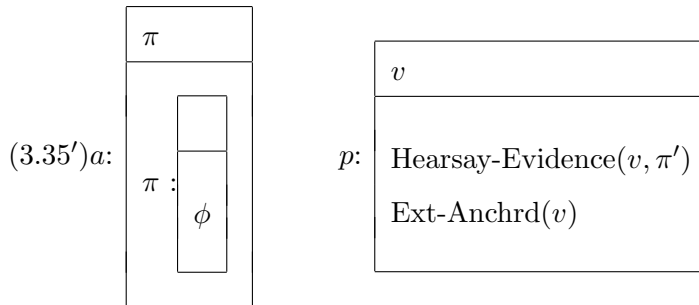
Note that here, *-chá*, like *nitigainai*, introduces the modal predicate *would*. This contrasts with *-mi*, immediately below, which is like *hazu* except that it has no modal component.

(3.34) *mi* $\phi$



The new case compared to the Japanese modals is represented by *-si*. How should it be represented? The crucial points are these: the proposition which *-si* modifies must be hearsay, which means that it must have been heard by the speaker. This action of hearing has a deictic character: whatever was heard must have been spoken by someone. This suggests that we should represent *-si* in a way close to the way *-mi* was modeled: with a presupposition that involves a specified evidential relation to an externally anchored object.

(3.35) *si* $\phi$



The analyses of the Quechua evidentials suggest the flexibility of the approach I have taken to the Japanese modals. It remains to be seen whether the predictions made by this approach prove to be correct: can *-chá* be bound within an antecedent (i.e. accommodated) in the way that *nitigainai* can? Is use of *-mi* within modally subordinate contexts infelicitous? These are interesting and important questions, but I will have to leave them for another occasion due to a lack of native speakers of Quechua who could provide judgements. Instead, I now turn to a detailed examination of the various modal sequences in Japanese and attempt to analyze why certain readings are present and why certain readings are not or are only marginal.

### 3.6 Explaining the facts

In this section I will use the dynamic system just discussed and the presuppositional analysis of evidentials to give an account of the Japanese modal subordination facts.

#### 3.6.1 Contrast 1: $\diamond\diamond$ and $\square\diamond$

Because we give no special evidential status to *kamosirenai*, we predict that a  $\diamond\diamond$  sequence should work just as in English and should be felicitous. The semantic computation proceeds just as in English, essentially as discussed in section 2.2.2. Update with the first sentence, of the form let's say *might* $\exists xWx$ , will yield a  $3(\sigma_1)$  each element of which is a descendent of the input  $3(\sigma)$  but which supports  $\exists xWx$ .



Update with the second sentence, of the form let's say *mightEx*, will yield  $3(\sigma_1)$ , each element of which is a descendent of a member of  $3(\sigma)$  that verifies *Ex*. But each element of the input set already contained a witness for the existential quantifier; thus anaphora will work out fine.

However, that doesn't explain why the other *kamosirenai* continuations are marginal. This may be because in Japanese it's simply not possible to establish a discourse link between these two constituents unless it's explicitly given; this idea will be elaborated further in what follows. Of course in English it's easy to form discourse connections by using implicit clues even in modal subordination contexts. But this simply may not be the case for Japanese; later we will see more evidence for this claim from adverbial constructions. In any case, this issue certainly deserves more study. But what if this idea is wrong? Another possible hypothesis is that in Japanese there is a rough shift from strong evidentials to weak evidentials within a modally dependent reading, unless there is a discourse break between the constituents marked by a particle (or the conditionalization which makes in effect *kamosirenai* $\phi$  not modally dependent on the  $\square$  modality in the previous constituent). It is clear that when we have a straight modally subordinate reading that the two constituents are related modally, and we might hypothesize that there's no need to make a real discourse connection. The second clause elaborates on the possibility focussed on in the first clause. The Japanese data seems to show that in this case, we cannot accommodate two different evidential presuppositions—and indeed with Elaborations, the constituents form a semantic whole (as shown by the need for the *subtype<sub>D</sub>* relation described in Chapter 1). Not so when we use *sosite* or the conditional. The two constituents are separate and not subordinately linked. Here the two evidential presuppositions can be (discourse locally) accommodated. The same goes with the stronger presuppositions of *hazu*.

### 3.6.2 $\diamond\Box$

As stated above, *sosite* in (3.22a) serves to mark Narration or Elaboration between the constituent  $\alpha$  in its scope and some other discourse segment:  $Narration(?, \alpha)$  or  $Elaboration(?, \alpha)$ . For our modal subordination texts, the relevant relation is Narration or possibly Narration with Result, as noted above.<sup>13</sup> Since e.g. (3.22a) includes only one other discourse segment, the first sentence  $\gamma$ , ? is resolved to this segment, giving  $Narration(\gamma, \alpha)$ .<sup>14</sup> The Narrative link suffices to fix the evidential requirements of *nitigainai*. This is because the evidential presupposition is a *relational one* between the information in the context plus perhaps some additional accommodated information and the proposition under the scope of the modal. Given what Johnson (2003) says about *nitigainai*, we could conceive of a notion of inference which takes into account notions of ordinary courses of events, as formally depicted using the *occasion* relation (which in turn depends on world knowledge or scripts), as well as of course conditional dependencies (which via a Deduction theorem would represent *logical* inferences as well as perhaps others). Thus, the evidential requirements of *nitigainai* are met by the discourse structure in such cases or by the presence of a conditional, as in (3.22b), a case which will be considered shortly. Given this additional content, there is no clash between the modal anaphoric behavior of *nitigainai* and its evidential presupposition. Things are otherwise with *hazu*. *Narration* does not come with any notion of causality *per se*, but only with an idea about natural courses of events.<sup>15</sup> Imposing a Narration relation between a first speech act and an assertion with *hazu* indicates that the relation between the two is natural, but,

---

<sup>13</sup>I will have reason to define a discourse relation holding for just these cases in the next chapter, however; it may therefore be this relation, *Dep*, that should be taken to hold between these discourse constituents.

<sup>14</sup>It is somewhat debatable whether *Narration* is the right relation to use here; see the next chapter for some discussion and an alternative proposal. I will assume that *Narration* is the right relation here.

<sup>15</sup>See however the following chapter for a reanalysis of the *occasion* relation with a somewhat different character, which will preserve the result for *nitigainai* gained in this chapter.

since it is still default and lacks real causality, does not provide in any way the ‘best possible’ evidential grounds for the assertion. In such a situation *hazu*’s presupposition cannot be satisfied. Note that such an account also explains why the hearsay modal *rasii* is infelicitous in conditional consequents, as in (3.7c); assuming that it has a semantics like that I gave to the Quechua *-si*, there will be no way to bind its presupposition either.

To make this idea clearer, consider the following. *Result* and *Narration* have an information dependency of the second constituent on the first, a dependency that is reversed for a relation like *Explanation*. It is this information dependency that conflicts with the evidential requirements of *hazu*. Since *hazu*, and also other evidentials with deictic presuppositions, makes crucial reference to *extralinguistic* information, it makes sense that forcing dependence via discourse relations on linguistically introduced information results in conflicts with the evidential presupposition and infelicity.

Let us look in detail at how this story works. I briefly discussed in the previous chapter how English examples like (3.36a) work in our story. The Japanese cases (3.36b,c) are identical in terms of how the modals themselves work.

(3.36)a.

- b. A wolf might come in. It would eat you first.
- c. ookami-ga kuru kamosirenai. #  $\emptyset$  anata-o taberu nitigainai.  
 wolf-NOM come might you-ACC eat surely  
 ‘A wolf<sub>i</sub> might come in. It<sub>i</sub> would eat you first.’
- d. ookami-ga kuru kamosirenai. #  $\emptyset$  anata-o taberu hazu-da.  
 wolf-NOM come might you-ACC eat surely  
 ‘A wolf<sub>i</sub> might come in. It<sub>i</sub> would eat you first.’

Assume that the logical form of these examples is as follows:

- $might(\exists x; Wx; Cx); would(Ex)$

Assume further that the initial information state is  $\sigma = \{\langle w, f, E_1 \rangle, \langle w', f', E_2 \rangle, \langle w'', f'', E_3 \rangle\}$ . Now we update with the first formula, *might*( $\exists x; Wx; Cx$ ). According to our semantics, this update succeeds for any given  $\sigma$  just in case there is some  $\epsilon$  in  $3(\sigma)$  that has  $\exists x; Wx; Cx$ -descendants. Let us assume that  $\langle w, f, E_1 \rangle$  and  $\langle w', f', E_2 \rangle$  have such descendants, and further that every  $\epsilon$  in  $E_2$  in fact has such descendants, but that  $\langle w'', f'', E_3 \rangle$  has none. Updating with this formula then eliminates  $\langle w'', f'', E_3 \rangle$  from our initial IS, since it has no  $\exists x; Wx; Cx$  descendent. The two states that remain will each verify  $\exists x; Wx; Cx$ , so each will contain at least one epistemic possibility  $\sigma'$  containing some individual, say  $a$ , such that  $2(\sigma') \frac{a}{x}$  and  $Wa; Ca$ .

Update with the next formula, *would*( $Ex$ ), is defined for an epistemic possibility  $\sigma$  only if every element of  $3(\sigma)$  has an  $Ex$  descendent. By stipulation, only  $\langle w', f', E_2 \rangle$  has this property, so update with this formula will eliminate  $\langle w, f, E_1 \rangle$ . Now, in each epistemic possibility  $\sigma$  in  $E_2$ , there is an individual  $a$  to which  $x$  is mapped by the assignment functions for those  $\sigma$ s.  $E$  is now predicated of each of these individuals. This is how modal subordination works out for the English case. What goes wrong in Japanese?

What goes wrong, of course, is the presuppositions.  $\partial(\textit{hazu}(Ex))$  requires there to be direct, externally perceptible evidence for  $Ex$ ; since there is no such evidence, the discourse crashes.  $\partial(\textit{nitigainai}(Ex))$  requires inferential evidence. Now one could take the content of the first sentence to provide such evidence—but we have already established that only certain discourse relations allow the right sort of information flow to support an evidential relation, and the relation that's inferred in Japanese in the absence of a particle, *Continuation*, is not one of these. As a result, the presupposition isn't satisfied, and the discourse crashes.

The problem here, then, in essence, is not that the modals have the wrong semantics to support modal subordination; rather, it's that they have presuppositions that can't be supported by the particular discourse relation that can be inferred

in such contexts, in the absence of a particle. This will be made more precise in the next subsection, where I consider the contribution of discourse particles in more detail.

### 3.6.3 Contrast 2: No particle vs. discourse particle

I can see two ways to think of the improvement of modal subordination with discourse particles. The first involves making use of SDRT notions of discourse relations, and making these notions interact with the evidential presuppositions associated with the modals. The second possibility relates the acceptability of modal subordination with particles to properties of the particles that are independent of discourse structure; specifically, the fact that the particles that license modal subordination all contain a propositional anaphor. In this section I consider each hypothesis in turn, eventually settling on the first hypothesis as the better one.

#### H1: Properties of the connective

The first hypothesis I will explore is that independent properties of the discourse particles themselves account for the improvement of modal subordination. Let's begin by considering just what particles do in fact improve modal subordination. It seems to me that there are three: *sosite* 'then', *sorede* 'that and', and *sorekara* 'after that'. One may note some morphological similarity between these connectives: they all begin with the morpheme *so*, which is one of the *so*-series distal demonstratives. These forms can serve to pick out salient elements in the context of speech, like other demonstratives, but also have anaphoric functions, as noted by Hoji et al. (2003).

In the particular case of the particles, *so* serves as a propositional anaphor. *Sosite* means something like 'that and' or 'that then', *sorede* 'that and', and *sorekara* 'that after'. An idea that therefore immediately comes to mind is that the possibility of modal subordination here stems from this property of the connectives; in

particular, I want to claim that the propositional anaphor picks up the content of the proposition in the scope of the modal, which is then ‘transported’ to the following sentence and can serve both to satisfy the evidential presuppositions there. We therefore don’t need to appeal to discourse relations, and so don’t run into problems with the felicitous  $\diamond\diamond$  sequence. I think that this way of approaching the data gives a simpler and clearer understanding of what is going on.

Before going into the details, let me first lay out some background about propositional anaphora (see also Asher 1993). Anaphors of propositional type seem to be able to ignore the ordinary DRT scope constraints on anaphora in Japanese in certain circumstances: when the sentence they appear in is modified by a modal operator, appears in a conditional, or appears with the particles *yo* or *zo*. I show here an example with modal operators, as these are the cases we are concerned with here; we have already seen an instance of the conditional case in (3.22b). I will not discuss the particle case in detail, but given my analysis of the particles in the next chapter, it will ultimately be assimilated to the modal case (as I will analyze the particles as having a modal interpretation in certain circumstances). First let’s consider the case where the demonstrative appears without an associated connective.

(3.37) Taroo-wa ano bangumi-o miteiru kamosirenai.  
 Taro-NOM that show-ACC watch might

‘Taro might be watching that show/It might be the case that Taro is watching that show.’

(3.38) iya, soo nitigainai  
 no that must

‘No, that must be right/No, he definitely will.’

Here, the second sentence does not claim that it is certainly the case that it might be that Taro watches that show; rather, it strengthens the claim made about Taro’s

watching that show in the first place. More formally, the second sentence doesn't mean *would(might( $\varphi$ ))* but simply *would( $\varphi$ )*. This shows that *soo* is able to access the content under the scope of the modal. The behavior of the anaphor seems to be different from English *that* here. The following discourse does not have the same interpretation and in fact (in the form closest to the Japanese case) is not felicitous at all.

(3.39) It might be the case that Taro is watching that show. # No, definitely that.

(3.40) It might be the case that Taro is watching the show. No, that's definitely true/right.

I am going to leave the English cases aside; this is not the place to give a theory of what is going on there.<sup>16</sup> The crucial point for us is that the Japanese anaphors can pick up the content under the modal when they themselves appear in a modalized sentence.

The same is true for the discourse connectives that contain *soo.*, as shown by the original example with *sosite*, repeated here, and the following two with *sorede* and *sorekara*.

(3.41)a. ookami-ga kuru kamosirenai. *sosite*  $\emptyset$ /soitu anata-o taberu  
 wolf-NOM come might then  $\emptyset$ /that-guy you-ACC eat  
 nitigainai.  
 surely

'A wolf<sub>i</sub> might come in. Then it<sub>i</sub> would eat you.'

b. ookami-ga kuru kamosirenai. *sorede*  $\emptyset$ /soitu anata-o taberu  
 wolf-NOM come might that.and  $\emptyset$ /that-guy you-ACC eat  
 nitigainai.  
 surely

'A wolf<sub>i</sub> might come in. And then it<sub>i</sub> would eat you.'

---

<sup>16</sup>See Asher (1993) for some relevant discussion of English propositional anaphors, though I cannot summarize this work here.

- c. ookami-ga kuru kamosirenai. sore-kara  $\emptyset$ /soitu anata-o taberu  
 wolf-NOM come might that-after  $\emptyset$ /that-guy you-ACC eat  
 nitigainai.  
 surely  
 ‘A wolf<sub>i</sub> might come in. After that, it<sub>i</sub> would eat you.’

Now, if these observations are correct, the modal subordination data can be explained as follows. The propositional anaphor is able to access the content under the modal in the first sentence for its antecedent. This content is then, by monotonic inference on the discourse connective, connected to the second sentence by a discourse relation (either *Narration* or *Elaboration*, depending on the content of the second sentence; in these examples, it is *Narration*). The content of the propositional anaphor then serves to satisfy the evidential presupposition of *nitigainai*; but, since *hazu* requires an external anchor, the anaphoric content isn’t sufficient to satisfy its presupposition, and infelicity results. This does seem to be the right explanation for the contrast.

Two concerns arise at this point. First, I seem to be mixing the points at which anaphora resolution and presupposition satisfaction occur. A standard assumption in dynamic semantics (and elsewhere) is that presuppositions must be satisfied or not before semantic computation can even take place. But if this is right, how can a propositional anaphor contribute to satisfaction even though it should not be resolved until after satisfaction takes place? The answer to this objection lies in the nature of the presuppositions in my analysis. They put requirements on the input context, but the requirements themselves are underspecified; they contain anaphoric conditions. What this means is that the presupposition will be introduced prior to resolution of the propositional anaphor; but, since the ordering of resolution of anaphoric conditions is left underdetermined, it is perfectly possible to resolve the propositional anaphor before resolving the anaphoric content of the evidential presupposition. The problem thus evaporates when one considers the issue more



deeply.

The second issue is more substantive and will ultimately lead to the rejection of the anaphora-based account. The problem is just this: propositional anaphors never need to obey constraints on accessibility. An account that makes crucial use of propositional anaphora therefore predicts that content under modals is *always* accessible when a discourse particle is used, which is plainly wrong, as shown by examples like (3.42).

(3.42)ookami-ga kuru kamosirenai. # sosite  $\emptyset$ /soitu anata-o taberu.  
wolf-NOM come might then  $\emptyset$ /that-guy you-ACC eat  
'A wolf<sub>i</sub> might come in. Then it<sub>i</sub> eats you.'

There is no obvious way to fix this problem. I therefore conclude that the account sketched here is not tenable, and that we need to look elsewhere for a solution. In the next subsection I will explore an account based on discourse relations (which I've already referred to implicitly in the discussion of the  $\diamond\Box$  contrast above); this theory is the one I will ultimately endorse.

## H2: Discourse relations

The second hypothesis I will explore is based strictly on discourse relations. The basic idea is that Japanese doesn't support a discourse relation between the first and subsequent sentences of modal subordination constructions due to lack of a suitable inference rule; the connective, however, enables construction of a relation due to its monotonic character. Let's see how this idea can be spelled out.

The argument for this analysis goes as follows. The evidential presuppositions of *nitigainai* are similar to those of *would* (as elaborated in Asher and McCready 2004). So why do they behave so differently with respect to modal subordination? An answer is forthcoming if we examine the discourse connections in Japanese. These are crucial for satisfying the evidential presupposition, which is relational.

Now if it's the case that *nitigainai*'s evidential presuppositions, as I have already argued, must be inferentially linked to the proposition under *nitigainai*'s scope, then it appears that both in English and Japanese that one has to form the inferential link and that inferences about discourse relations are crucial. In English there's no problem about inferring a sort of Conditional Result which supports the inferential link from the proposition under  $\diamond$  together with accommodated material to the proposition under  $\square$ . In fact there seems to be a default rule of the form in (3.43) in English, where the semantics of *Cond-Result* mirrors in the discourse structure the semantic connection between the epistemic modals when they are attached to each other—that is, a conditional with the addition of an *occasion* relation. Here *Epist\_mod* indicates the presence of an epistemic modal, *Ant\_anaph*( $\alpha, \beta$ ) indicates a situation in which  $\alpha$  contains an antecedent for some anaphoric element in  $\beta$ , and *Cond\_Result* is a discourse relation combining elements of the semantics of *Result* (shown below) and conditionals.<sup>17</sup>

$$(3.43) (\langle \tau, \alpha, \beta \rangle \wedge \text{Epist\_mod}(\alpha) \wedge \text{Epist\_mod}(\beta) \wedge \text{Ant\_anaph}(\alpha, \beta)) > \text{Cond\_Result}(\alpha, \beta)$$

$$(3.44) \text{Result}(\alpha, \beta) \Rightarrow \text{cause}(e_\alpha, e_\beta)^{18}$$

This observation leads to the core of the discourse relation-based analysis. On this analysis, the conclusion is that Japanese lacks a defeasible rule of this sort. The lack of such a rule would also explain why  $\square\diamond$  sequences are unavailable with a modally subordinated reading unless there are explicit discourse cues to indicate the appropriate relation. The idea here is that the connection between two modalized propositions does not support the script-like knowledge needed to infer the Narration relation; and, indeed, this relation does not seem to be supported in general, as shown by the infelicity of continuations with *kamosirenai*.

<sup>17</sup>This particular statement seems to be correct regardless of whether one accepts the hypothesis itself.

<sup>18</sup> $\Rightarrow$  is a conditional in the language of information content, which is distinct from the glue logic used to infer discourse relations. See Asher and Lascarides (2003) for details.

Now, lacking a rule to connect modalized utterances, it is impossible to connect the content in the scope of the two modals in any way other than with a contentless, ‘junk’ relation which I’ll call Continuation, which simply states that the second segment in some way ‘continues’ the first, but in a way that’s free of semantic content. Supporting the evidential content requires a certain kind of information flow, which is what the discourse structure gives us—whether as in Narration it’s certain enabling relations (i.e. *occasion*) or as in Result it’s a causal or inferential dependency or as in Elaboration a type of dependency based on subtype relations. Only in the presence of such relations can the right connection between the evidential presuppositions of *nitigainai*( $\phi$ ) (or *would* $\phi$ ) and  $\phi$  be constructed. But in Japanese these relations must be explicitly marked in the discourse—not so in English. If this derivational link is explicitly made, the discourse becomes acceptable. This fact suggests that it is indeed the difficulty of inferring discourse relations that causes problems in the modal subordination examples.

On the other hand, when given a context that provides evidence for the relevant statements under *nitigainai* the felicity of the discourses improves dramatically (see the survey results at the end of the chapter). In this case, *hazu*’s deictic presupposition isn’t met even when the first modality is by hypothesis anchored. The issue here most likely involves the *best possible grounds* presupposition of *hazu*: dependency on another modal, regardless of its evidential status, is insufficient to satisfy the *bpg* presupposition, which must be anchored in a genuinely external and certain fact, which is incompatible with modality.

Thus, the explanation for why  $\diamond\Box$  sequences are bad in general is that Japanese lacks a rule that allows inference of a discourse relation that can support the evidential content of the  $\Box$  modals. Adding additional context as in the ‘bare2’ case, however, allows the evidential content to be contextually bound *independently* of the content of the first sentence; and use of a discourse particle forces

monotonic inference of a more contentful relation such as Narration that can in fact support the evidential link. A nice side effect of this analysis is that it explains why we have no problem in  $\diamond\diamond$  (*kamosirenai-kamosirenai*) discourses—since *kamosirenai* lacks evidential content, it doesn't matter if a contentful discourse relation is present or not, since there's no need to bind any evidential presuppositions.

I now proceed to consider the conditional case, first giving some general background on conditional constructions in Japanese.

### 3.6.4 Background on Japanese conditionals

I first give some background on Japanese conditionals to prepare for the discussion of conditional licensing of modal subordination in the section to follow. The following discussion is drawn largely from Johnson (2003). There are four types of Japanese conditional: *tara*-conditionals, *to*-conditionals, *ba*-conditionals, and *nara*-conditionals, named according to the morphological element which appears at the end of the antecedent clause. Japanese conditional constructions can be interpreted as meaning either 'when  $\varphi$ ' or 'if  $\varphi$ ', at least in the case of *tara* and *to*; the form *ba* only has a conditional meaning. There is another conditional form, *nara*, which I do not consider, for the reason that the antecedents of *nara*-conditionals seem to be presupposed, as shown by the following example:

- (3.45) Taro-ga kuru nara ore-wa ikanai yo  
 Taro-NOM come COND I-TOP not-go YO  
 'If Taro's coming, I'm not going to go.'  
 $\delta$ : Taro is coming

Since I am primarily concerned with Japanese conditionals as vehicles for licensing modal subordination, situations in which the antecedent is presupposed can be left out of the picture for the present.

Johnson translates *to* as ‘when’, *ba* as ‘whenever’, and *tara* as ‘if’. The degree of contingency or hypotheticality associated with each form thus varies depending on what the speaker/interpreter take to be the probability of the antecedent being true. As a default, though, interpreters seem to interpret each form differently, as shown by (3.46). The *to* form in (3.46a) tends to be understood as a lawlike statement that is taken to be a generally accepted fact; thus, the *to* clause is interpreted like a when-clause. (3.46b), which uses the *tara* conditional form, has a more specific interpretation on which the sentence refers to a particular instance of the antecedent (for example, today and tomorrow); here, a true conditional interpretation is likely. Finally, (3.46c) is understood as a biconditional, according to Johnson.

- (3.46)a. nisi-no sora-ga akai to tugi-no hi-wa hareru  
 west-GEN sky-NOM red COND next-GEN day-TOP be.sunny  
 ‘When/if the sky in the west is red, the next day will be sunny.’
- b. nisi-no sora-ga akakat-tara tugi-no hi-wa hareru  
 west-GEN sky-NOM red-COND next-GEN day-TOP be.sunny  
 ‘When/if the sky in the west is red, the next day will be sunny.’
- c. nisi-no sora-ga akakereba tugi-no hi-wa hareru  
 west-GEN sky-NOM red-COND next-GEN day-TOP be.sunny  
 ‘When/if the sky in the west is red, the next day will be sunny.’

In the following, I will restrict my attention to *tara*-conditionals, as they are the only ones with true episodic readings (in that the *to*- and *ba*-conditionals tend to involve generic or lawlike statements).

### *Tara*-conditionals

The conditional form *tara* breaks down morphologically into a past tense *ta* and an additional morpheme *ra* which does not seem to have an independent meaning. As pointed out by Ogiwara (1989, 1996), although the past morpheme *ta* indicates a past

event with respect to utterance time in simple sentences, in the context of embedded clauses the past reference is with respect to the reference time of the matrix clause (cf. Smith 1997 for discussion of the notion of ‘reference time’). Given this fact, it is unsurprising that the antecedent of *tara* conditionals, like *to* conditionals, is interpreted as occurring before the event described by the consequent.

*Tara* conditionals lack the habitual quality seen in conditional sentences formed with *to*. Rather, they generally refer to individual events. This distinction is brought out by the following minimal pair, in which the *tara* form is interpreted as a conditional statement about what will happen on a given day, while the *to* form describes the speaker’s general proclivities:

- (3.47)a. (asita) tenki-ga yokattara turi-ni iku  
 (tomorrow) weather-NOM good-COND fishing-DAT go  
 ‘If the weather is good (tomorrow), I’ll go fishing.’
- b. tenki-ga ii to turi-ni iku  
 weather-NOM good COND fishing-DAT go  
 ‘When the weather is good, I (always) go fishing.’

Along similar lines, Johnson (2003) shows that *to* is not compatible with punctual adverbials such as *at 4:00* or *when I met him yesterday*, while *tara* is incompatible with universal temporal adverbials like *always* or *every time*. The character of *tara*-conditionals as referring to individual events is the reason that they are the only conditionals that can license modal subordination.

An interpretation where the antecedent behaves like an English *after* clause can also be found. Here the hypothetical/conditional interpretation is not present, probably because the speaker can control the realization of the event in the consequent.

- (3.48)mukoo ni tui-tara tegami-o kaku  
 over.there to arrive-COND letter-ACC write  
 ‘After I get over there I’ll write you.’

Aspect can influence the interpretation of *tara* conditionals, especially the use of statives, as shown in (3.49). Here, the *tara*-clause in the first sentence acts like an *after* or *when*-clause, but in the remaining three examples is interpreted as a true conditional. In (3.49a) both antecedent and consequent denote events, an achievement in the antecedent and an activity in the consequent (Smith, 1997). The addition of the modal *daroo* to the consequent in (3.49b) makes it stative, as does the progressive operator *teiru* in the antecedent of (3.49c) and in both clauses of 3.49d).

- (3.49)a. uso-o tuitara atama-o nagu-rare-ta  
 lie-ACC tell-COND head-ACC hit-PASS-PST  
 ‘When/After I told a lie I was hit on the head.’
- b. uso-o tuitara atama-o nagu-rare-ta daroo  
 lie-ACC tell-COND head-ACC hit-PASS-PST probably  
 ‘If I had told a lie I probably would have been hit on the head.’
- c. uso-o tuite-i-tara atama-o nagu-rare-ta  
 lie-ACC tell-PROG-COND head-ACC hit-PASS-PST  
 ‘If I had been telling a lie I would have been hit on the head.’
- d. uso-o tuite-i-tara atama-o nagu-rarete-i-ta  
 lie-ACC tell-PROG-COND head-ACC hit-PASS-PROG-PST  
 ‘If I had been telling a lie I would have been hit on the head.’

The reason for the counterfactual interpretation in (3.49b) is probably the combination of modal and past tense (cf. Iatridou 2000, though she considers mostly past tense in the antecedent); since past events are already determinate, and since because the sentence describes the speaker’s actions it is improbable that the sentence is uttered as an epistemic conditional, the modal functions only to introduce reference to counterfactual situations.

The counterfactual interpretations in (3.49c,d) are more problematic. It is not clear to me what the relation between imperfectivity, or stativity, and counter-

factuality is here. I leave this problem for future work, as it does not have any direct impact on the modal subordination problem that is my main focus.

### 3.6.5 Conditional dependence

The fact that use of a conditional improves the felicity of modal subordination in Japanese can be thought of as follows: repeated content serves to restrict the set of epistemic possibilities to those verifying the proposition in the scope of the first modal. In order to make this work out, we need an interpretation of the conditional where the evaluation of the antecedent affects the epistemic possibilities of the input state. There is independent evidence for this in both languages. Gillies (2004) argues that conditionals have a modal flavor: more specifically, that they should obey the following equivalence:

- $\neg(\phi \Rightarrow \psi) \leftrightarrow (\Diamond(\phi \wedge \neg\psi))$

This notion fits in well with the analysis given thus far. I have given strong evidence that a conditional improves the interaction between Japanese modals. In Gillies’s (2004) definition conditionals introduce tests on (our first component of) information states: a state  $\sigma$  will pass  $\phi \Rightarrow \psi$  iff  $\sigma$  obeys the Ramsey test for this conditional—i.e.  $\sigma + \phi + \psi = \sigma + \phi$ . However, this doesn’t reflect the fact that  $\psi$  can actually alter the information state—e.g., by having existential quantifiers in it. And we need to test epistemic possibilities in a given context not the discourse context itself. But we can get something equivalent by extending our notion of a descendant to a sequence of formulas. To say for example that  $\sigma$  has a  $\phi, \psi$  descendant is just to say that  $\sigma$  has a  $\phi$  descendant  $\sigma'$  and  $\sigma'$  has a  $\psi$  descendant  $\sigma''$ . The definition below ensures that all the epistemic possibilities of a given element of the discourse context together with the (actual) world and assignment support the conditional.

- $\sigma[\phi \Rightarrow \psi]_{\mathcal{A}} \sigma$  iff every  $\phi$  descendant of  $\sigma$  has a  $\psi$  descendant and  $\forall \epsilon \in \mathfrak{Z}(\sigma) \forall \epsilon'$  such that  $\langle \epsilon, \epsilon' \rangle \models_d \phi, \exists \epsilon'' \langle \epsilon', \epsilon'' \rangle \models_d \psi$ .



Though the interpretation of the conditional is close to Gillies’s or Veltman’s, there are some advantages to the current approach. With Gillies’s or Veltman’s notion of a test, conditionals can’t contribute to information growth, not unless we take a more complicated picture of what it is to learn new information (where we might distinguish between different information states and so consider sets of information states as inputs). By separating out elements of discourse contexts from epistemic possibilities we can “learn” (in our simplified sense here) conditionals, eliminating those worlds whose epistemic possibilities don’t support the conditionals newly introduced into the discourse context. Because of the semantics of conditionals, updating the discourse context with a conditional will automatically be reflected within the epistemic possibilities permitted by the discourse context.

The conditional once again permits the accommodation of the evidential requirements of *nitigainai*. The reason is that, given script-like knowledge that makes available an *occasion* relation in conjunction with the information in the conditional antecedent, the information in the antecedent can serve as a binder for the evidential presupposition in a theory of presupposition like that of van der Sandt (1992), or allow it to accommodate, in a theory like that of Beaver (2002).<sup>19</sup> In contrast, *hazu* has a presupposition which must be bound deictically to some external fact, which again generates a conflicting implicature with the deictic presupposition, resulting in infelicity of modal subordination.

### 3.6.6 Some additional observations

I now want to briefly lay out some additional facts relating to subordination in other languages. I will not be able to consider this data in detail here, but it provides some interesting avenues for future work.

Note that similar facts hold in Hindi; modal subordination is impossible

---

<sup>19</sup>This presupposition can also be bound by content that is the result of inferencing, as shown by the ‘bare2’ cases with *nitigainai*.

without a conditional clause or discourse particle, as shown by McCready and Reese (2002), from which all the following Hindi data is drawn.

(3.50) shaayad koi bheRiyaa kamre-mē ghus aa-e  
 maybe some wolf room-in enter COME-Sbjv  
 ‘A wolf might come in.’

(3.51)a. # vo tum-ko sab-se pahle khaa-e-gaa  
 it you-ACC all-than before eat-Fut  
 ‘It will eat you first.’

b. [ agar vo kamre-mē ghus aa-yaa ] to vo tum-ko sab-se pahle  
 [ if he room-in enter COME-Pfv ] then he you-ACC all-than before  
 khaa-e-gaa  
 eat-Fut  
 ‘If it comes in, it will eat you first.’

(3.52)a. vo tumhari behen ko bhii khaa le-gaa  
 it your sister ACC also eat TAKE-Fut  
 ‘It will also eat your sister.’

b. ?? (phir/uske-baad) vo tumhari behen ko khaa le-gaa  
 (then/after-that) it your sister ACC eat TAKE-Fut  
 ‘??(Then/After that) it will eat your sister.’

However, Hindi also makes an additional possibility available; use of the *past habitual*; this mood can subordinate, and makes modal subordination possible just in case the sentence beginning the discourse contains a counterfactual conditional, as in the following example.

(3.53)a. agar Mary-ke paas microwave hotii, to vo us-kaa kabhii prayog  
 if Mary near microwave be-Hab, then she its ever use  
 naa kartii.  
 Neg do-Hab.f.  
 ‘If Mary had a microwave, she would never have used it.’

- b. vo us-ko drawing room me rakh detii. us-ke paRosii  
 she it-ACC drawing room in keep give-Hab.f. she-GEN neighbors  
 microwave-ko nihaarte.  
 microwave-ACC admire-Hab.M.  
 ‘She would have kept it in the drawing room. Her neighbors would have  
 admired it.’

See McCready and Reese (2002) for an account of this phenomenon.

Similar facts appear to hold in Italian, where the particle *allora* seems to license modal subordination (see the section on emotives below for more detail on a possibly similar Japanese case); but these facts still need to be checked on in detail. Note that in Hindi the emphatic particle *-hii* does not help with licensing modal subordination at all (Pranav Anand, p.c.).

### 3.7 Comparison with other accounts of modal subordination

In this section I will briefly present the three most detailed modal subordination theories along with an evaluation of their capacity to be extended to the Japanese data.<sup>20</sup> I begin with two theories, those of Roberts (1987, 1989, 1995) and Geurts (1995, 1999), that take modal subordination to be a largely presuppositional phenomenon.<sup>21</sup> I continue with a discussion of the work of Frank (1997), who takes modal subordination to fall out of the properties of modals and anaphoric phenomena.

Of course, there are many other theories of modal subordination formulated in a variety of frameworks. Groenendijk et al. (1996) provide a formalization in an extension of DPL with Veltman’s dynamic modal operator (Veltman, 1996) in

<sup>20</sup>See Asher and McCready (2004) for some more general criticism of these three approaches.

<sup>21</sup>I should mention that I discuss the 1999 version of Geurts’s theory rather than the first version of the work (that in his 1995 dissertation), as the later version contains his most recent views on the topic.

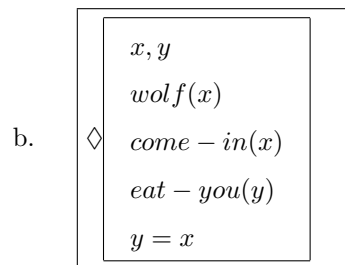
which modal subordination is licensed; however, constraints on coreference (e.g. the infelicity of (2.2a) vs the felicity of (2.2b)) don't fall out of the theory, and so I won't consider it here in more detail. I also do not discuss in detail the theory of Stone (1999), who uses a variant of Webber's (1988) *tense as anaphor* account, along with a complex system of dynamic environments and quantification over static sets of possible worlds. I also ignore accounts of anaphora across other non-factual contexts, such as attitude reports (cf. Asher, 1987; Roberts, 1995; van Rooj, 2000) and questions.

### 3.7.1 Accommodation: Roberts (1989)

Roberts proposes handling modal subordination through a mechanism of *accommodation* (Lewis, 1979), by which the underspecified restrictor of the second modal is introduced. Discourse referents appearing within this implicit restrictor are then available as antecedents for the pronominal.

Before presenting this account, however, Roberts discusses an ultimately inadequate approach to the data which she terms the *insertion approach*, which it will be useful to get out of the way first. On this account, one simply adds the discourse referents and conditions of the second sentence to the subDRS introduced by the first. The following structure will then be obtained for (3.54a), a variation on (2.2b):

(3.54)a. A wolf might come in. It might eat you first.

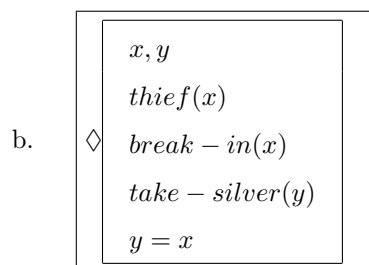


This representation gives the correct truth conditions for (3.54), and so looks plau-

sible on first inspection.

Consideration of a wider class of examples, however, shows that the insertion approach is not the right one to take. It will suffice to look again at example (2.2b). Again, one will simply add the material in the second non-factual sentence to the subDRS introduced by the first. Roberts, in her discussion, gives (3.55a), which is structurally identical to (2.2b) in the relevant respects, the following representation:<sup>22</sup>

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

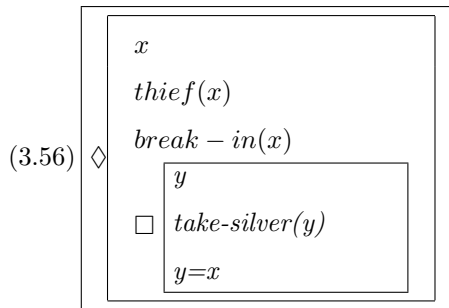


The truth conditions given by the insertion approach for this example are not correct. The representation in (3.55b) is interpreted to mean that it's possible that a thief might break in and take the silver. But the discourse actually says something rather stronger: that it's possible that a thief might break in, and *if he does* he will take the silver.

One might take issue with Roberts' representation here, and object that the representation in (3.55b) leaves out the modality inherent in *would*, which is closer to a necessity operator (ignoring for the moment the counterfactual aspect of *would*). But on the insertion approach, even addition of a necessity operator won't help; rather, we will simply get another wrong representation:

---

<sup>22</sup>Roberts attributes the example to Fred Landman.



Here, though the necessity operator is represented, the relative scopes of the possibility and necessity operators aren't right. This DRS says that a thief might break in, and that it's possible that it's necessary that if he does he will take the silver; but in a standard Kripke model for modal logic this will give the wrong truth conditions for the discourse; again, they will be too weak. The discourse states that if a thief breaks in, he will take the silver, as discussed above; but on standard assumptions about modal semantics, the interpreted DRS simply requires that it's true in some accessible possible world  $w$  that a thief break in, and that in some (potentially different) accessible possible world  $w'$ , the individual corresponding to that thief take the silver in all worlds accessible to  $w'$ . It could be that  $w = w'$ , in which case the interpretation will be correct; but this isn't required by the semantics, which is not as it should be.

The problem here is caused by the different modalities in use in (3.55a), where possibility is followed by certainty (necessity), where in (3.57), the two modals both express possibility, and on which the insertion approach works.

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

It turns out to be the case that the insertion approach works only for cases in which the modals have the same quantificational force. When a weak modal precedes a strong one, or vice versa, the wrong truth conditions are derived. Thus the insertion approach cannot provide a fully general account of modal subordination.

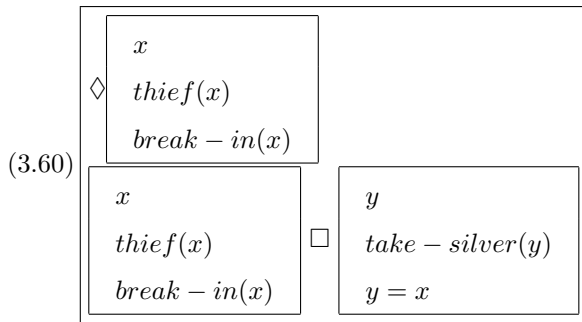
Roberts suggests a different approach, which she terms *accommodation of the missing antecedent*. She uses an extension of David Lewis's (1979) mechanism of *accommodation*. When an utterance is made that requires for its interpretation a presupposition not already present in the common ground of the discourse (Stalnaker, 1979), the action of adding that presupposition to the common ground is called accommodation. Roberts' extension of the accommodation mechanism allows any contextually salient proposition to be accommodated. However, this extension deviates quite drastically from Lewis's original idea, in two respects. First, the accommodated proposition must be present in the immediately preceding context, where in the more generally accepted form of accommodation, the accommodated information isn't present in the common ground at all. Second, as noted by Geurts (1999), ordinary accommodation involves insertion into the common ground of information that's included in the presupposition trigger itself:

(3.58) John's daughter is hungry.

(3.59) Jerry regrets having run for President.

In (3.58), the possessive *John's daughter* triggers accommodation of the information that John has a daughter, and in (3.59), the factive verb triggers accommodation of Jerry's having had a shot at the Presidency. Roberts requires modals to accommodate information that is not a part of their lexical meaning except in the sense that modals incorporate a covert restrictor; in fact, it's not clear that Roberts takes modals to *presuppose* their restrictors at all. So we see that Roberts' accommodation mechanism represents a radical departure from the original idea of accommodation. This is, however, not in itself sufficient reason to reject it.

Roberts proposes that (3.55a) receive the following representation. Note that the proposition under the possibility operator has been accommodated to serve as an implicit restrictor for the modal in the second sentence:



This structure, when interpreted, can be seen to give the right truth conditions. The  $\square$  connective is just a universal quantification over possible worlds, so that the second DRS condition means that in every world where a thief breaks in, he takes the silver.

Roberts extends the standard DRT accessibility definition to include structures like this one. Accessibility is defined such that the necessity operator connecting two subDRSs behaves similarly to the conditional  $\Rightarrow$ ; that is, referents in the left conjunct are anaphorically accessible to referents in the right conjunct. So we see that Roberts' account gives both the right truth conditions for discourses involving modal subordination, and enables anaphoric coreference.

The model-theoretic interpretation of structures like the above is based on the *relativized modality* of Kratzer (1981); that is, modal operators are interpreted with respect to a *modal base* and an *ordering source*. Each is a set of propositions (possible worlds). The modal base, written  $m(w)$ , represents the set of worlds with respect to which a modalized proposition is evaluated, and is defined as a function  $f$  from a world to a set of propositions, the denotation of which varies with the type of modality being used. For instance, when applied to an epistemic modality,  $f$  will return the set of propositions known in  $w$ . The modal base then is the intersection of these propositions:  $\cap m(w)$ . The ordering source, written  $o(w)$ , represents an ideal world, and induces a partial order on the worlds in  $\cap m(w)$  defined in terms of similarity to the ideal of  $o(w)$ . In Roberts' account, the modal base and



ordering source are pragmatically supplied and restrict interpretation within the model theory without being represented in the DRS. This point has been criticized by Frank, whose theory is in part designed to solve these two problems.

The above analysis seems correct in its outlines, but there are difficulties. The extension of accommodation proposed by Roberts is a very powerful mechanism. As she notes, there is nothing in principle to prevent accommodation of a suitable antecedent in any case of infelicitous use of a pronoun. She proposes several restrictions to rule out certain bad cases. First, as mentioned above, she requires that the immediately preceding context include a suitable antecedent that can be accommodated. Her second constraint is that the antecedent must have been expressed *overtly* in the case of a pronoun, ruling out cases like Partee's famous example (3.61).

(3.61)a. One of the marbles is missing. It is probably under the couch.

b. Nine of the ten marbles are here. # It is probably under the couch.

Another constraint Roberts assumes is that the second sentence must be in non-factual mood, which excludes discourses like (2.2a). This constraint is not actually necessary for subordination in the general case, as shown by examples of quantificational subordination like that in (3.62); see Sells (1985) and Wang et al. (2003), as well as Roberts (1987) and others, for discussion. It may be needed for modal subordination, however, although the examples of subordination with the particles *yo* and *zo* I discussed earlier seem to be counterexamples. See the next chapter for an analysis of these facts.

(3.62)Every student walked across the stage. He took his diploma from the dean  
and returned to his seat. (Sells, 1985)

Frank (1997) points out that the condition on nonfactual mood is also not sufficient; different modalities are sometimes compatible with each other, and sometimes not.

For instance, although (3.63b) and (3.64b) are in nonfactual mood, the modalities they contain aren't compatible with the *counterfactuality* introduced by the subordinating sentence.

(3.63) John should have bought a bike for his daughter. (Frank, 1997)

- a. She would have liked it.
- b. # She will like it.

(3.64) If I had a bike with a basket, I could/would take water with me. (Frank, 1997)

- a. I could/would ride the whole day long.
- b. # I can/will ride the whole day long.

Geurts (1999) presents additional counterexamples to the non-factuality constraint. As formulated by Roberts, it says only that non-factual mood is required. But, as Geurts points out, it's possible to find discourses that include plausible restrictors and are in non-factual mood, but still don't allow modal subordination:

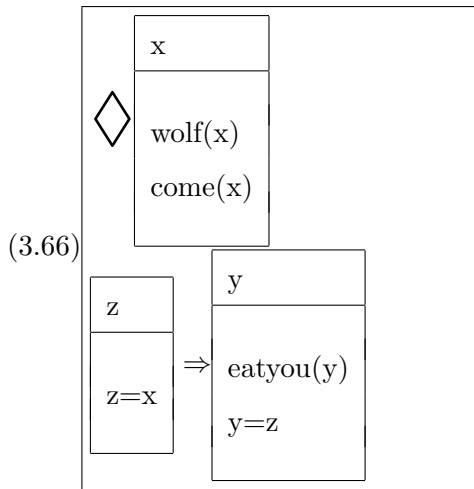
(3.65)? Fred may have seen a bear. It can dance. (Geurts, 1999)

Since this problem is orthogonal to accounting for the basic Japanese facts (although similar phenomena certainly can be found in Japanese as well), I refer the reader to the works cited for possible analyses.

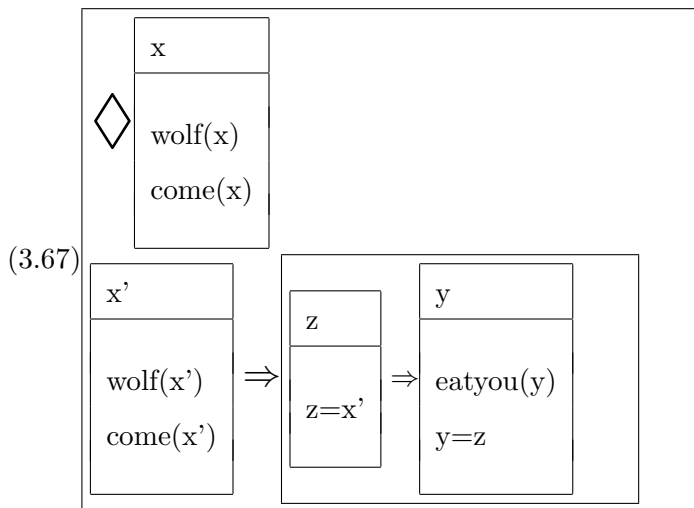
Another obvious problem with this account is that it forces accommodation of a proposition that is already present in the discourse. This seems counterintuitive; why reintroduce something that already exists? Both of the remaining DRT accounts we will consider respond to this problem, by positing that modals introduce presuppositions of a more usual sort that must be anaphorically bound (Geurts) or by introducing anaphoric referents on subDRSs (Frank). Each of these accounts also addresses particular empirical problems with Roberts' theory.

The Roberts account, despite (or perhaps because of) its simplicity, does not do well with the Japanese data. Essentially, the account consists of a single mechanism, that of accommodating some previous constituent DRS as restrictor for the DRS exhibiting modal subordination. The first problem here comes with the classic modal examples. The Japanese examples require an overt conditional. This, at first, just seems to be an overt version of the accommodated restrictor. But accommodation is a pragmatic mechanism that serves to repair the common ground, and as such presumably is universal. Why would such a mechanism function differently in Japanese and English? Japanese definite descriptions and factive verbs, to cite a few instances of presuppositional expressions whose content could be expected to accommodate in some circumstances, never get expressed overtly even when accommodation takes place. If this attempt to save the Roberts account is on the right track, one would expect overt content to appear in other cases where accommodation takes place; that we don't suggests that something has gone wrong. For that matter, we don't see other instances of Roberts-style accommodation even in English, suggesting that the mechanism she proposes is extremely specific to the modal subordination problem and is not independently motivated. Finally, in the Japanese case the nouns in the conditional clause appear as null pronouns, meaning that they are also subordinated. If the whole DRS is copied as in the Roberts account, there is no room for anaphoric reference in null pronouns here; rather, we would expect the pronouns to show up in full NP form, as they did in the copied DRS in (3.55b).

One possible line that might be taken to explain this is the following. Perhaps what happens is that the DRS is copied, but NP-introduced conditions within it using discourse referents  $x$  and  $y$  are ignored and replaced lower down with conditions of the form  $z=x$ , which effectively introduce null pronouns. (3.66) shows how this would look.



A moment's reflection is enough to see that this is not a viable solution. The whole purpose of accommodating a higher DRS is to allow anaphoric reference to a referent under the scope of a quantifier. Since the antecedent  $x$  is under the scope of that quantifier as well, it still cannot be accessed from the conditional antecedent. If we were to pursue this line, we would find that we had to accommodate the restrictor once again to provide suitable referents for the null pronouns in the conditional antecedent, as shown in (3.67).



But this operation is recursive and seems rather implausible, and in any case gets the anaphoric dependence wrong, for the assignment function need not give the dis-

course referents  $x$  and  $x'$  the same individual as denotation. We could of course put additional constraints on the models, but by now even the most staunch supporter of Roberts should be wondering if there isn't some better way to handle these facts.

As far as the details of my own analysis, one could add the evidential presuppositions that I propose to the account of modals presented by Roberts. But some difficulties still would remain unsolved; notably, it seems impossible to understand the contribution of the sentence-final particles *yo* and *zo* on this approach, while the more semantically oriented approach I advocate can handle the particle facts with relatively little difficulty. I conclude that extending the accommodation approach to the Japanese case requires a number of unsupported assumptions and that a solution should be looked for elsewhere.

### 3.7.2 Presupposition: Geurts (1999)

Geurts' theory of modal subordination is an extension of the *presupposition as anaphora* theory of van der Sandt (1992). In van der Sandt's theory, presuppositions, like anaphors, must be bound to an appropriate antecedent somewhere in the context. These presuppositions are represented as subDRSs which move 'up and left' from the subDRS in which they first appear along a path dictated by the accessibility relation. If there is no appropriate antecedent available in the context, the presupposition is accommodated at the highest level at which it's both *consistent* and *informative* as long as the result is a well-formed DRS; that is, when accommodating the presupposition in the global DRS would not make the DRS inconsistent (defined, for global DRS  $K$ , as  $K \models \perp$ ), entail information in subordinate DRSs, or leave any discourse referent unbound, the presupposition can be accommodated in the global DRS. When the global DRS isn't available as a site for accommodation, the presupposition can be inserted into other, subordinate DRSs, which allows

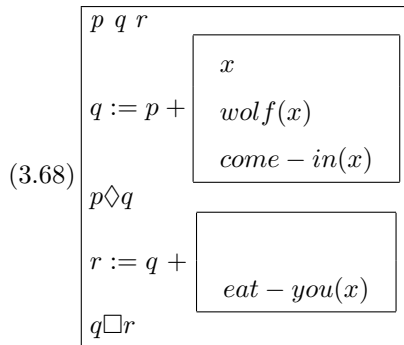
presuppositions to be blocked when appropriate.<sup>23</sup>

Geurts' analysis of modal subordination is based on the idea that modals *presuppose* their implicit domain restrictors. Consequently, the presupposed restrictor must be bound to some element in the context. In order to provide appropriate antecedents for this binding, Geurts introduces *propositional referents* and *propositional terms* into the DRS language. Propositional referents, of the form  $p, q$ , are simply (indexed) propositions, while propositional terms, of the form  $p + \varphi$ , indicate the update of  $p$  with the information in  $\varphi$ . Now, the processing of each clause of a discourse that includes an intensional operator introduces a new propositional term into the DRS. These referents provide the right kind of antecedents to anaphorically bind the presupposed restrictors of modals.

For illustration, Geurts gives (2.2b) the representation in (3.68), after resolving all presuppositions and eliminating unnecessary notation. Note here the conditions of the form  $p \diamond q, q \Box r$ ; these conditions directly incorporate the quantificational analysis of modality by explicitly representing the restrictor, quantificational force and scope as a tripartite object. Note also that the restrictors of the modals are always bound to the most local antecedent. Geurts ties this behavior to pragmatic preference for binding presuppositions to objects nearby in the discourse model (though he doesn't formalize this), and so claims that this property requires no stipulation (unlike Frank's anaphoric theory, as we will see in the next section).

---

<sup>23</sup>For interesting discussion of van der Sandt's theory, see Beaver (2002), where the theory is contrasted with other accounts of presupposition.



This analysis maintains the attractive aspects of Roberts' proposal, while eliminating the reliance on accommodation. However, it is not immune to criticism. In particular, like Roberts' account, the type of modality being used is not represented at the DRS level but only in the model theory, where interpretation is constrained by a modal base and ordering source (Geurts retains Kratzer's semantics for modals). This lack of DRS-level representation means that *linguistically introduced* modalities aren't able to modify the modal base and ordering source against which a modality is evaluated. Frank (1997) cites examples like the following as problematic for both Roberts' and Geurts' theories:

(3.69) The government has just passed a new tax law for cars. If Max had bought a Ferrari last year, he would have had to pay much higher taxes for it now.  
 (Frank, 1997)

In the above discourse, the deontic modality in the second sentence is dependent on the context introduced by the first sentence: the *new tax law for cars*. Since in the theories of both Roberts and Geurts, the ordering source and modal base are decided *in the model theory*, there is no way to further relativize the modality to incorporate these new deontic constraints. Frank argues that such a mechanism is necessary, and that as a result the *hybrid* approaches of Roberts and Geurts fail. In the next chapter, I will extend the Asher-McCready system to cases like these.

A possible approach to the Japanese data within this framework would be to say that in English, modals are presuppositional, but in Japanese they are not,

so a conditional clause must be introduced to do their work. This option was not available for Roberts because the notion of accommodation she introduced did not require the presence of a presupposition for accommodation, as I read her; if a presupposition is in fact needed for Roberts, what I have to say about the Geurts account will apply to her account as well. Such an account seems problematic: I have shown above that the Japanese modals certainly have a presuppositional character. In addition, semantically similar expressions across languages don't often seem to have substantially different presuppositions. Certainly the Japanese equivalents of most presupposition-inducing sentences—definites, factive verbs, expressions like *even* or *only*—have precisely the same presupposition as their English equivalents. And, although the Japanese modals do seem to have evidential presuppositions, in contrast to the English modals—though again see Westmoreland (1998); Palmer (2001) for analyses of English *must* as an evidential—it's not clear that they should behave differently in terms of their core semantics. The present account has the advantage of treating the two similarly in this respect; an advantage which would have to be abandoned on a Geurts-style account, or indeed by accounts based on Frank or Roberts.

### 3.7.3 Anaphora to contexts: Frank (1997)

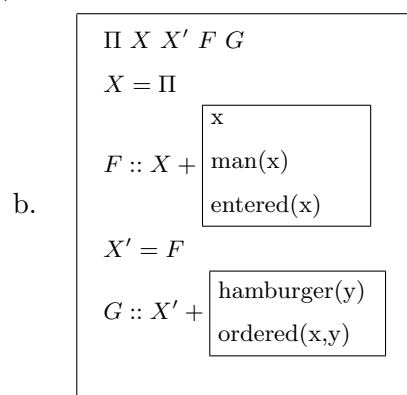
The representations used in Frank's anaphoric analysis have much in common with those used by Geurts. Her Annotated Discourse Representation Theory (hereafter ADRT) expands the DRT representation language to include *context referents* (CRs), objects whose denotations are ordered pairs consisting of a world and an assignment function, written  $\langle w, e \rangle$ . Each sentence in a discourse is associated with one of these objects, whereas in Geurts' theory, only modalized sentences are associated with propositional referents), while quantified and modal sentences introduce two context referents, one for the restrictor and one for the nuclear scope.



Each new sentence has an underspecified anaphoric context referent which must be resolved to something already existing in the discourse, as usual with anaphora. When speaking about the actual world, Frank stipulates that this anaphor must be resolved to the context referent of the immediately preceding sentence; this ensures that no information is lost as the update process proceeds. We saw in the last section that in Geurts' theory this stipulation wasn't necessary, as pragmatic conditions on presupposition resolution gave us the result automatically. Without this constraint, Frank's system risks inconsistency, for if new discourse referents are introduced but one chooses to pick up a distant antecedent, the old assignment function will not support anaphora.

ADRT produces representations like (3.70) for nonmodalized discourse. Here  $\Pi$  is the referent for the empty context.

(3.70)a. A man entered. He ordered a hamburger.



In this ADRS we see that the discourse referent  $F$  introduced by the first sentence is required to resolve to the first variable (= the empty discourse) because of the constraint on update mentioned above. The rest of the updates proceed similarly.

In modal sentences the situation is more complex. The referent introduced by the nuclear scope is required to resolve to the referent introduced by the restrictor. But what happens when modal sentences are introduced in succession; that is, how about modal subordination? The key point here is that the CR of a quantifier's

scope is accessible to the CR of a subsequent restrictor. Because of this, the modal context can be continued, as coreferentiality of CRs will cause one to update the other. Frank ensures this by means of her accessibility definition, which follows.<sup>24</sup> Here  $e, g$  are assignment functions.

(3.71)**Definition of Accessibility (Semantic Version).** Given a DRS  $K'$  with annotating referent  $G$  and a state  $\langle w, e \rangle$  with  $G \in \text{dom}(e)$ , a discourse referent  $y$  is accessible from a referent  $x$  occurring in  $K'$  iff  $y \in \text{dom}(g)$  for all  $\langle w', g \rangle \in e(G)$ .

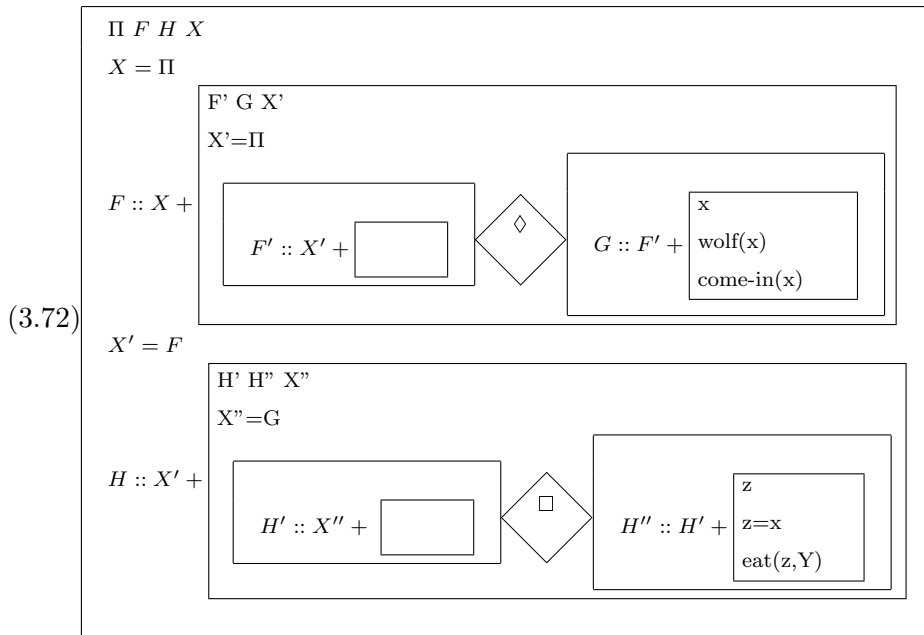
This definition says that a discourse referent is available for coreference iff it is defined for every world-assignment function pair verifying  $G$ ; that is, if it is defined in all embeddings which are extended to verify  $G$ . Obviously, this will hold for factual discourse. In the modal case, when a DRS  $K$  containing a tripartite (modal) DRS is chosen as antecedent to another DRS  $K'$  containing a tripartite DRS, the subDRSs of  $K$  will be available as antecedents for the CRs annotating the subDRSs of  $K'$ . Then, for the restrictor of the modal, it will mean that any discourse referent in whatever is chosen as the antecedent of the restrictor's CR will be accessible for coreference within the restrictor, and thus within the nuclear scope. Crucially, this allows modal subordination, given that the scope of a previous modal is selected as the modal base.

(3.72) illustrates the application of this definition with the ADRT representation of the familiar modally subordinated discourse (2.2b).<sup>25</sup>

---

<sup>24</sup>Frank provides two accessibility definitions: a syntactic one and a semantic one (Frank, 1997, page 105). I consider only the semantic one here. In any case, the two produce equivalent results.

<sup>25</sup>Here  $Y$  refers to 'you', the addressee of the utterance. Note also that in the tripartite DRSs, I have departed from Frank's representation by using modal operators (rather than her  $\exists, \forall$ ) in order to emphasize that quantification over possible worlds is taking place.



In this ADRS the update process is more complicated. Resolution of the context referents (CRs) introduced by the modal sentences proceeds as in (3.72), while the referents of the nuclear scopes are always resolved to their corresponding restrictors as stipulated above. Only resolution of the CRs introduced by the quantificational restrictors remains to be discussed. For the first sentence it's simple: only two referents are available,  $X$  and  $X'$ , both of which represent the empty context. For the restrictor of the second sentence, more options exist:  $\Pi$ ,  $F$ ,  $F'$ , and  $G$ . Of these, however, only  $G$  contains a possible antecedent for the anaphor *it*. Therefore resolution to  $G$  is chosen, and so coreference is allowed for the anaphor introduced in the scope.

The criticisms I made of the Geurts account above also apply here. Why should the anaphoric possibilities of Japanese modals be any different than those for modals in English? It's also not clear how to integrate the particle facts into this kind of analysis, which depends crucially on representational structure. As I'll argue in the next chapter, the particles rely on semantic facts (in conjunction with some facts about discourse structure) to induce modal subordination. They thus

need more direct access to the semantics than is provided by a purely DRT-style analysis.

## Chapter 4

# Particles and Information

Japanese has a distinguished class of lexical items, the *sentence-final particles* (hereafter SFPs). SFPs are ubiquitous in Japanese conversation, as even a cursory glance at a corpus of spoken Japanese makes clear. As one would expect from such a well-studied language, many researchers have examined these particles. Most work in this area, however, is situated within sociolinguistic or cognitive semantic frameworks; to my knowledge, there are no linguistically oriented formal accounts of SFPs, although some treatments can be found in the AI literature. My purpose in this chapter is to examine SFPs from a formal semantic perspective; by doing so, some hitherto elusive facts about these particles will be shown to follow from their basic meaning coupled with general principles about conversational interaction.

The plan of the chapter is as follows. In section 1, I will provide data that shows some salient characteristics of the particles I will analyze, along with some generalizations about their use. Section 2 provides a dynamic framework for the analysis of dialogue, which is then used in section 3 in an account of SFP meaning and use. Section 4 compares my results with those of previous theories of SFPs.

## 4.1 The big picture

Japanese SFPs make up a large and heterogeneous class. Most particles seem to lack truth-conditional content completely, although a few work as ordinary semantic operators in some cases. For instance, the particle *ka* serves to mark questions, and can be viewed as an operator from propositions to sets of propositions (question denotations).

- (4.1) a. Taroo-ga    kita  
         Taroo-NOM came  
         ‘Taro came.’
- b. Taroo-ga    kita    ka  
         Taro-NOM came KA  
         ‘Did Taro come?’

In this dissertation, I will concentrate on particles that lack obvious truth-conditional content. There are many such particles, each complex enough that it is impossible to do them all justice in a single dissertation. I will concentrate on the class of particles Masuoka and Takubo (1989) call the *sirase* ‘notification’ particles: *yo* and *zo*;; coincidentally, these are also the particles that can license modal subordination. Although Masuoka & Takubo also class the particle *ze* as a *sirase* particle, I will not consider it in this dissertation. As we will see, these particles show some similarities in their use, but are rather distinct semantically. These particles are often set up in opposition to the *dooi/kakunin* ‘agreement/affirmation’ particles *ne* and *na*, which I will not analyze in this dissertation, as their semantics involves forays into the semantics of questions and of bias, which would take us far afield. I leave the issues here for future work. An additional particle, *naa*, will be considered in chapter 5.

A position commonly found in the literature is that the *sirase* particles serve to introduce new information to a hearer, while the function of the *kakunin* particles is to mark information that the speaker takes to be already known to the hearer.

I will advocate a version of this position articulated within a dynamic semantic framework. In the remainder of this section, I will present data that motivates this analysis.

## 4.2 The *sirase* particles

Of the three *sirase* particles *yo*, *zo* and *ze*, *yo* is by far the best-studied in terms of meaning. When looking through the literature, it can sometimes seem as if all research on SFPs is focused exclusively on *yo* and the *kakunin* particle *ne*.<sup>1</sup> As a consequence of all this work, *yo* is relatively well understood semantically. Most research on *zo* and *ze*, on the other hand, has concentrated on the fact that these particles are ordinarily used by males, and therefore tends to be sociolinguistic in character. While one can glean some insight into the semantics of these particles by reading this literature, *zo* and *ze* are certainly less well understood than *yo*.

### 4.2.1 Yo

The particle *yo* has no obvious truth-conditional effects. In (4.2), adding *yo* seems to provide emphasis, or adds a sense of urgency to the utterance.

- (4.2) a. Taroo-ga kita  
Taro-NOM came  
'Taro came.'
- b. Taro-ga kita yo  
Taro-NOM came YO  
'Taro came.'

It is often claimed in the literature that *yo* is used with sentences whose propositional content is not already known to the hearer. This idea seems to be

---

<sup>1</sup>I will not discuss *ne* further in this work, but I think that it is most likely a marker of tag questions. A full analysis of its semantics requires an investigation of question denotations and bias (cf. Gunlogson 2003), which is beyond the scope of this dissertation.

essentially right; variations of it account for the vast majority of extant proposals about *yo*'s meaning. Various ideas can be found in the literature. A well-known example is the 'territory of information' theory espoused by Kamio (1994), who analyzes *yo* as used with content that is 'closer' to the speaker than the hearer, in the sense that the informational content originates with the speaker, or that the speaker feels some intimate connection with the information. This notion is meant to contrast with the *kakunin* particle *ne*, which, Kamio says, marks information in the hearer's 'territory.' Numerous counterexamples to this latter claim have been noted, however (as will be discussed shortly).

The proposal that *yo* marks new information accounts for the infelicity of using *yo* in (4.3), just in case the sentence is used as a reminder of the meeting time to a person who knows it already. Use of *yo* is possible, however, if the hearer seems to have forgotten the meeting time (e.g. he doesn't seem to be going anywhere even though it's already 2:55).

(4.3) Kyoo no miitingu wa sanji kara desu (# yo)  
 Today GEN meeting TOP 3:00 from COP (YO)

'Today's meeting starts at 3:00.' (Suzuki Kose, 1997)

Here, because the hearer already knows the proposition expressed, use of *yo* is disallowed. I believe that this idea is essentially right. Kose (1997) notes that as a result of the function of *yo* to mark new information, an implicature arises from the use of *yo* that the speaker believes that the hearer does not yet believe the propositional content of sentence. This claim is certainly correct—at least intuitively, although it is not completely clear that this should be an implicature (in fact, I will claim that it is presuppositional); however, without an analysis of *yo*'s function embedded in a larger logical system, there is no way to formally characterize the reasons for this implicature arising, or circumstances (if any) under which it can be overridden. One of my goals in this chapter, then, will be to give a concrete formalization.



The fact that *yo* may be used in (4.3), along with similar uses of the particle, is used by Takubo and Kinsui (1997) to support an analysis of *yo* in terms of a version of Kamio’s mental space theory. Their idea is that the information of an individual (his IS) can be divided into ‘subdomains’: the D-domain, which holds information from long-term memory and information acquired through direct experience, and the I-domain, which contains information indirectly acquired and present in short-term memory. Further, the D-domain is directly accessible to its agent, but the I-domain is not. Within this framework, they analyze *yo* as “a marker for setting up a proposition in the I-domain for further inference (Takubo and Kinsui 1997: 756).” This proposition may be new—i.e. communicated to the hearer as new information—or already present in the D-domain, but currently unavailable in the I-domain. Presumably this second case is the one that is seen in (4.3).

While this theory has attractive elements, I find it somewhat obscure. In particular, it is not clear to me what the relationship between information in the D-domain and information in the I-domain is, and the relationship between each of these and reasoning. It seems that in reasoning one uses information from both long- and short-term memory, but Takubo & Kinsui’s suggestion that only the D-domain is accessible seems to indicate that only information in long-term memory is used in reasoning. In the analysis of the particle itself, it is not obvious why use of *yo* should move information to the I-domain, particularly if it is not accessible to reasoning. In sum, I find the theory somewhat obscure, and will not consider it in more detail here.

Noda (2002) claims that *yo* has additional functions in addition to simply marking new information. For Noda, *yo* indicates that the speaker believes that the hearer should recognize, and accept (*ninsiki suru*), the propositional content of the sentence. Thus, the content marked by *yo* must not only be new to the hearer, but also believed by the speaker to be of importance to the hearer. If the speaker believes

the *yo*-marked information to be irrelevant to the hearer for whatever reason, use of *yo* is infelicitous, on Noda's account. This idea seems to be correct. For instance, (4.4) is odd if the hearer has no interest in the arrival of the train.

- (4.4) densya kita yo  
train came YO  
'The train has come!'

*Yo*, then, is crucially focused on the hearer's interests, and on what the speaker takes the hearer's optimal conduct to be with respect to pursuing those interests.

Suzuki Kose (1997) provides a number of interesting facts about several of the particles to be considered in this dissertation. One observation she makes about *yo* is that in contexts where the speaker has absolute authority over the hearer, use of *yo* is infelicitous.<sup>2</sup> For example, in the context of an army officer ordering his troops, (4.5a) is good, but the corresponding version with *yo* (4.5b) is bad:

- (4.5) a. Susume!  
Advance!  
'Advance!'
- b. Susume yo  
Advance YO  
'Advance, man!'

Kose believes that *yo* emphasizes the personal desires of the speaker; as a result, she claims (4.5b) is bad because it is inappropriate for an officer to emphasize personal desires when giving orders to his subordinates. I will present an alternative account later in the chapter.

Another interesting fact noted by Kose (1997: 32) is that marking imperative forms (requests, commands) with *yo* produces an effect of insistence. Thus, (4.6b)

---

<sup>2</sup>In fact, although Kose does not say so, *sirase* particles in general are bad in these sorts of contexts.

sounds as if a previous request to buy a new skirt was refused, while (4.6a) has no such implication. Similarly, in (4.7b) the speaker seems to have personal reasons for wanting the hearer to consult with him, while (4.7a) doesn't have this feeling. Note that this personal impact arises only with imperatives, although Kose doesn't explicitly say so. With assertions, no personal desire need appear, as shown clearly by (4.3).

(4.6) a. atarasii sukaato katte  
 new skirt buy-IMP  
 'Buy (me) a new skirt!'

atarasii sukaato katte yo  
 new skirt buy-IMP YO

'(Come on), buy (me) a new skirt!'

(4.7) a. Mata nanika attara soodan ni kite kudasai  
 again something is-COND consultation for come-IMP please  
 'If anything else happens, please come talk to me again.'

b. Mata nanika attara soodan ni kite kudasai yo  
 again something is-COND consultation for come-IMP please YO  
 'If anything else happens, please come talk to me again.'

Finally, *yo* produces a sense of insistence even in assertions, as if the hearer is being urged to accept the proposition in its scope. Dialogues in which the hearer has expressed dubiety about the truth of that proposition provide cases in which this element of *yo*'s meaning comes out clearly. In the following example, when A reiterates his statement about John's having gone, an utterance without *yo* gives the implication that A doesn't care whether B accepts what he says or not. Assuming that A does care, infelicity results from not using *yo*.<sup>3</sup>

---

<sup>3</sup>When *yo* is not used, A seems to be making an absolute statement: he did go home, and I don't care if you believe it or not. Since people do say such things, marking A's second utterance as pragmatically infelicitous with '#' is overgeneral, but is correct if A is assumed to care whether B accepts his statement or not.

- (4.8) 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!’

It will be convenient to summarize the facts about *yo* here:

- *Yo* marks information that is currently unavailable to the hearer, whether it be completely new information or something the hearer has temporarily forgotten.
- It marks information that the speaker believes to be relevant to the hearer’s goals or otherwise important to the hearer.
- Use of *yo* can produce an effect of insistence or personal involvement.

#### 4.2.2 Zo

*Zo* is far less studied than *yo*, and consequently one can find relatively little literature relating to its semantics. The first thing to note is that *zo* also marks new information; this, of course, is the reason for its classification by Masuoka and Takubo (1989) as a *sirase* particle. *Zo*, however, generally sounds much rougher than *yo* and is low-register, as suggested by the glosses below, which are intended to bring out the feel of the Japanese sentences:

- (4.9) a. sigoto yameru  
           job quit  
           ‘I’m going to quit my job.’

- b. sigoto yameru yo  
 job quit YO  
 ‘I’m going to quit my job, man.’
- c. sigoto yameru zo  
 job quit ZO  
 ‘I’m going to fucking quit my job.’

Noda (2002) analyzes *zo* as indicating that the propositional information it marks is new to the hearer, and will cause a change to the hearer’s current cognitive state. When addressed to a hearer, it causes the hearer to accept the information in the sentence, and indicates that the speaker is trying to change the hearer’s cognitive state. Because of the speaker’s explicit attempt to change the hearer’s information state, use of *zo* sounds stronger than *yo*.

This definition implies several differences between *zo* and *yo*: *zo* entails an explicit attempt to modify the hearer’s information state, and *requires* that the marked information be new. This newness requirement is stated by Noda to contrast with *yo*, which may be used as a reminder; however, this doesn’t seem to be right, for *zo* can also be used in the context of reminding someone of something, as in (4.10).

- (4.10) Kyoo no miitingu wa sanzi kara da (# zo)  
 Today GEN meeting TOP 3:00 from COP (ZO)  
 ‘Today’s meeting starts at 3:00.’

Kose (1997) analyzes *zo* using what she calls the ‘*zo*-principle:’

- (4.11) Kose’s *zo*-principle (version): the use of *zo* reflects the speaker’s belief that i) the addressee does not believe the proposition expressed and ii) it is necessary for the addressee to believe it.

What she means by the second part of the principle is not completely clear, but I think that it lines up well with Noda’s analysis, described above: the speaker

believes that the hearer *must* accept the *zo*-marked content.

Kose's principle has several consequences. The first condition implies that *zo* is not used in mutual belief situations and that it occurs with (hearer-)new information. The principle also implies that *zo* is used when the speaker believes that the hearer believes that the propositional content does not hold: so in cases where the speaker is trying to correct the content of the hearer's belief state in accordance with his own beliefs. The second condition implies only that a speaker doesn't use *zo* with information that he takes to be unimportant.

To summarize briefly:

- *Zo* is used with information that the speaker believes to be new to the hearer.
- It indicates that the speaker is attempting to force the hearer to accept the information the sentence expresses.

It should also be noted that the distribution of *zo* is much more restricted than that of *yo*, which can appear, for instance, in imperatives; *zo* appears only in declarative sentences. I assume that this is simply a syntactic fact.<sup>4</sup>

Now I want to return to modal subordination. Consider again (3.24), repeated here as (4.12). How can modal subordination be possible without a modal in the second sentence (4.12)? A first guess: *yo* itself is modal. But this isn't so, for (4.13) shows that even a sentence with *yo* can describe a fact or event that has actually taken place (as do other examples shown earlier in this chapter).

(4.12)ookami-ga kuru kamosirenai.  $\emptyset$ /soitu anata-o taberu yo.  
wolf-NOM come might  $\emptyset$ /that-guy you-ACC eat YO

'A wolf<sub>i</sub> might come in. It<sub>i</sub> (will) eat you first, man (rough gloss).'

(4.13)Taro-ga kinoo gakkoo-ni kita yo  
Taro-NOM yesterday school-DAT came YO

---

<sup>4</sup>It would be nicer if this fact followed somehow from the semantics; but at present I am not sure how to make it do so. I leave this problem for future work.

‘Taro came to school yesterday.’

It turns out that subordination is also possible with the particle *zo*:

(4.14)ookami-ga kuru kamosirenai.  $\emptyset$ /soitu anata-o taberu zo.  
wolf-NOM come might  $\emptyset$ /that-guy you-ACC eat ZO

‘A wolf<sub>i</sub> might come in. It<sub>i</sub> (will) eat you first, man (rough gloss).’

As we have seen, *yo* and *zo* are not always interpreted modally; but must be in order to license modal subordination. The goal of the next section is to clarify the circumstances in which a modal interpretation can be obtained.

### 4.2.3 When are particles modal?

Interestingly, although the particles are not always modal (as shown by (4.13), repeated here as (4.15)), they do seem to be interpreted in a modal manner in the modal subordination contexts that are our focus: (4.16), for example, is understood in the conditionalized manner familiar from previous accounts of modal subordination like those of Roberts and Frank.

(4.15)Taro-ga kinoo gakkoo-ni kita yo  
Taro-NOM yesterday school-DAT came YO

‘Taro came to school yesterday.’

(4.16)ookami-ga kuru kamosirenai.  $\emptyset$ /soitu anata-o taberu zo.  
wolf-NOM come might  $\emptyset$ /that-guy you-ACC eat ZO

‘A wolf<sub>i</sub> might come in. It<sub>i</sub> (will) eat you first, man (rough gloss).’

One might conjecture that the presence of a modal in the sentence preceding the one with the particle is enough to induce a modal flavor. But this is not the case:

(4.17)John-wa ima suupaa ni it-tei-ru nitigainai. soko-no  
John-TOP now supermarket to go-PROG-NPST must. there-GEN  
sake-wa totemo yasui n da yo  
alcohol-TOP very cheap EMPH COP YO

‘John must be at the supermarket now. The liquor’s very cheap there, man.’

Here, despite the presence of *nitigainai* in S1, S2 is understood as an ordinary, non-modal assertion. I will now provide a semantics that can account for this contrast. As I will show, the facts involve a crucial interaction between the meaning of the particles themselves and the context they appear in. In particular, I theorize that the implicit conditionalization in the modally subordinate examples stems from the kind of *topic* that such discourses involve. This point will be clarified immediately below, after I give a proposal about the basic semantics of the two particles. We will need this semantics for it to be clear how the modalization process works and what the difficulties are in implementation.

### 4.3 *Yo* and *zo*: a proposal

I take *yo*, *zo*, and the English *man* (discussed in the next chapter) to be imaging operators that depends on an epistemic possibility in the input context. Their semantics involve several appeals to propositional attitudes. Let me first provide some background on imaging operators by discussing the analysis of the irrealis mood in Asher and McCready (2004).

As is well known, the antecedent of counterfactuals must be in irrealis mood; this is clearer for the Romance languages than in English, but holds for English as well. The irrealis operator in the antecedents of counterfactuals introduces, according to Asher&McCready, an imaging operator  $\bullet$  on context elements, which is successful (i.e. every  $\sigma \in \bullet(\sigma, \|\phi\|)$  has a  $\phi$  descendant) and preserves as much information about what normally goes on in  $\sigma$  when  $\phi$  holds as possible. Let  $\mathcal{E}(\bullet(\sigma, \|\phi\|))$  denote a set of epistemic possibilities based on  $\bullet(\sigma, \|\phi\|)$ , and let  $\bullet(\epsilon, \|\phi\|) = \bigcup\{\bullet(\sigma', \|\phi\|) : \sigma' \in \epsilon\}$ . Then the semantics of irrealis mood can be given as follows.



- The irrealis operator (Asher and McCready, 2004):
- $\sigma[\text{irr}\phi]_{\mathcal{A}}\sigma'$  if  $\sigma' = \langle 1(\sigma), 2(\sigma)\mathcal{E}(\bullet(\sigma, \|\phi\|)) \rangle \wedge$   
 $\forall \epsilon \in 3(\sigma) \bullet(\epsilon, \|\phi\|) \subseteq \bullet(\sigma, \|\phi\|)$
- $\sigma[\text{irr}\phi]_{\mathcal{A}}0$  otherwise.

The irrealis operator moves the set of epistemic possibilities in an input element to those that are based on a set of normal worlds, in particular those normal worlds that satisfy the formula in its scope. The basic notion of an imaging operator, then, is that it maps a set of input epistemic possibilities to another set, which supports the formula in its scope. The function of this operator in the antecedents of counterfactuals is to ensure that the conditional is evaluated in a (set of) world(s) that verifies the antecedent (see Asher and McCready (2004) for details). I will argue that  $y_o$  and  $z_o$  have a similar function, differing in that they serve to update the actual world.

The notion of new information I will capture using a presupposition about hearer beliefs. In order to do so, I will define an operator  $\mathcal{B}$  that lives on epistemic states:  $\mathcal{B}_X\varphi$  will indicate that the individual  $X$  believes  $\varphi$ . I will take belief states—doxastic states—to live on epistemic states in the sense of being a subset of them. This is a simplification in that it assumes that individuals do not believe anything that is inconsistent with their knowledge; clearly, this is not correct for most people, but it will simplify our semantics considerably. I now define the  $\mathcal{B}$  operator. According to this definition,  $\mathcal{B}_X\varphi$  is true just in case all the epistemic states that verify all  $X$ 's beliefs also verify  $\varphi$ .

- $\sigma\|\mathcal{B}_X\varphi\|\sigma'$  iff  $\forall w'[1(\sigma)R_Xw' \rightarrow \exists \text{sigma}'' ]$  where  $\sigma'' = \langle 1(\sigma'), 2(\sigma'), 3(\sigma'') \rangle$  and  $3(\sigma)\|\varphi\|3(\sigma'')$ .

We need one more piece before the particle semantics can be spelled out. I will make use of a deontic modality to account for the effect of speaker/hearer in-

volvement and relevance; to do so, we need to extend the modal semantics in chapter 3 to deontic modalities. Given the semantics for epistemic modalities we already have, this task is relatively straightforward. The basic setup of the framework can remain identical; the epistemic states remain as possibilities, and satisfaction still must be defined in terms of them *except* when a deontic modal is involved. The construction of the deontic possibilities themselves can be set in the same way as the recursive clauses for epistemic possibilities. I will use  $D$  for the set of deontic possibilities. Since the construction is identical, I will not reproduce it here, referring readers to the previous chapter for details. Thus deontic possibilities are also recursively constructed from worlds and sets of assignment functions. However, we must abandon the constraint that the original set of possibilities must include the actual world, which was used for epistemic possibilities  $E$ ; certainly there is no requirement on deontic possibilities that they be realized, just as reflexivity is not a desirable property for frames in deontic modal logics.

Where to put the deontic possibilities themselves? These possibilities are world-dependent; what should be done changes depending on what is. The question comes down to whether  $D$  should depend on the world parameter—the world of utterance,  $1(\sigma)$ —or should be relativized to individual members of the set of epistemic possibilities,  $3(\sigma)$ . Thus the choice is between complicating the model tuple to include deontic possibilities, giving 4-tuples  $\langle w, f, \mathcal{E}, \mathcal{D} \rangle$ , or to complicate the construction of epistemic states so that each state is associated with a set of deontic possibilities. I think that, ultimately, the best route is the first, for two reasons. First, deontic possibilities don't seem to differ (intuitively) to the extent that would be predicted by allowing them to vary with epistemic states. Anchoring them directly to the world of utterance should be sufficient. Second, embedding the deontic states within the epistemic states complicates the definitions of both ordinary (epistemic) and deontic satisfaction and update considerably, for relatively

little gain (at least for our purposes here). Therefore I will simply complicate the models to 4-tuples, adding  $\mathcal{D}$  to our earlier models. I use  $\rho$  for individual deontic states to avoid confusion with the degree function.<sup>5</sup> Nothing in the earlier definitions will change substantially from this move. We need only assume a fourth element in the tuple, that isn't changed by any of the operations earlier discussed. And, in fact, satisfaction can be defined just as for the epistemic cases too.

We can now extend the definition of update to include deontic modalities. This is straightforward; like epistemic modals, deontic modals do not change the elements of the information state that pertain directly to the actual world — $1(\sigma)$  and  $2(\sigma)$ —meaning that it suffices to add them to the update clause for modalities. The revision is trivial and is left to the reader.

Now we can give a semantics for the deontic modals themselves. Here  $\rho\star$  is understood in just the way  $\epsilon\star$  was in chapter 2; as a state to which the  $\star$  operation has been applied, for some formula  $\psi$ .

- $\sigma[\textit{could}\phi]_{\mathcal{A}}\langle 1(\sigma), 2(\sigma), 3(\sigma), \mathcal{D}' \rangle$ , where  $\mathcal{D}' = \{\rho' : \exists \rho \in 4(\sigma)\langle \rho, \rho' \rangle \models_d \phi\}$ ,  
if there is such a  $\rho$ ;  
 $\sigma[\textit{could}\phi]_{\mathcal{A}}\emptyset$  otherwise.
- $\sigma[\textit{should}\phi]_{\mathcal{A}}\langle 1(\sigma), 2(\sigma), 3(\sigma), \{\rho' : \exists \rho \in 4(\sigma)\langle \rho, \rho' \rangle \models_d \phi\} \rangle$ ,  
if  $\forall \rho \in 3(\sigma)\exists \rho\star \langle \rho, \rho\star \rangle \models_d \phi$ ;  
 $\sigma[\textit{should}\phi]_{\mathcal{A}}\emptyset$  otherwise.

As with the semantics for the epistemic modals, we allow both the existential and the universal deontic modals to transform the input context, although the changes are done by different means (the  $\star$ -operator in *would* and *should*, and a simpler kind of resetting in the *might/could* case). This is clearly necessary, given examples of the following kind, in which the existential in the scope of the first

---

<sup>5</sup> $\rho$  is supposed to be mnemonic for ‘right’, as in ‘it is right to ...’; I am looking for a deontic flavor here.

deontic modal changes the input set of deontic states so that anaphora is supported in the scope of the second.

- (4.18)a. You should buy a car. It could be useful for you.  
b. You could have a hamburger. It should fill you up.

It would also be desirable for this semantics to support anaphoric dependence between modals of different types, such as that in (4.19); but the issues here are complicated (Asher, 1987; Heim, 1992; Frank, 1997) in terms of exactly what modals support what relations. However, in the examples in (4.19), anaphoric dependencies—i.e. modal subordination—is clearly supported; thus a connection between epistemic and deontic modalities must be made.<sup>6</sup>

- (4.19)a. You should buy a car. It would be useful for you.  
b. John might drink a beer. He really shouldn't drink it though.

As things stand, however, these kind of dependencies are not supported, because there is no interaction between the deontic and epistemic possibilities. The two updates are completely distinct. Two fixes are possible for this problem. The first is to make the deontic possibilities simply live on the epistemic ones; but this solution may be too simple in light of the complexities raised by Heim. In the following subsection I will briefly outline a different fix in terms of constraints on models. This section is not crucial to anything that follows and may be skipped without any fear of confusion in the rest of the discussion.

### 4.3.1 Excursus: bisimulations for anaphoric dependencies

All we need is for the assignments in the deontic possibilities to be supported by the epistemic possibilities, and vice versa. We can get this in a simple way by applying

---

<sup>6</sup>Speakers seem to vary in how acceptable they find (4.19b). I use it here for expository purposes only.

a condition that the assignments must be *bisimilar*. Bisimulations are a familiar notion in standard modal logic (see e.g. Blackburn et al. 2001); the idea is that two models are analogous in a very specific way. In particular, suppose there are two models  $A$  and  $B$ , with accessibility relations  $R$  and  $R'$  and formula sets  $\Gamma$  and  $\Gamma'$  respectively. For the two models to be bisimilar, there must be a transition in  $R$  for every transition in  $R'$  and vice versa, and each state in  $A$  that verifies a formula in  $\Gamma$  must correspond to a formula in  $B$  that verifies the corresponding formula in  $\Gamma'$ . Otherwise stated, there must be a mapping from  $A$  to  $B$  (the ‘back’ mapping) and from  $B$  to  $A$  (the ‘forth’ mapping) that preserve truth for all modal formulas. If this is the case, then the two models are indistinguishable if one uses only the resources of modal logic.

We can introduce a condition on  $\mathcal{D}$  and  $\mathcal{E}$  that allows them to support mutual anaphoric dependencies. The condition is simply this:  $\mathcal{D}$  and  $\mathcal{E}$  must be *bisimilar* with respect to assignments.

- ‘Back’:  $\forall \epsilon \exists \rho [2(\epsilon) = 2(\rho)]$
- ‘Forth’:  $\forall \rho \exists \epsilon [2(\rho) = 2(\epsilon)]$

Any model that satisfies these conditions will have identical variable assignments across deontic and epistemic possibilities, supporting anaphora across the two types of modal. To see how this works, consider how the system will treat the example (4.19b). The first sentence is modified by an epistemic modal and contains an existential quantifier. Thus all epistemic states output by update with it contain a witness for *a beer*. The second sentence is modified by a deontic modal. Without the bisimulation condition on assignments, there would not necessarily be any witness for *a beer*, since update with the first sentence only took place within the epistemic states. The bisimulation condition requires every variable assigned a value in  $3(\sigma)$  to also have a value within  $4(\sigma)$ , however. Because of this, a binder is present for the

pronoun *it* within the deontic states as well. This is the value of using bisimulations here.

Of course, the bisimulation condition as it stands is too permissive; there are certainly instances where anaphora across epistemic and deontic contexts is not supported, and so there must be additional conditions on when anaphora is possible (see the references above for detailed discussion of this issue). The issues are complex, however, and I cannot address them here. I instead return to the semantics of the particles.

### 4.3.2 Semantics of *yo* and *zo*

Now we are ready to make an attempt at a full semantics for *yo*. This semantics will be modified below.

- Semantics of *yo*: first attempt
- Presupposition of *yo*:  $\forall \epsilon \in \mathfrak{Z}(\sigma) : \langle \epsilon, \epsilon \rangle \models \mathcal{B}_S \neg \mathcal{B}_H \varphi$
- semantics as an imaging operator:  $\sigma \Vdash_{yo} \varphi \Vdash^a \sigma'$  iff  $\sigma \Vdash \mathcal{B}_S \text{should} \mathcal{B}_H \varphi \Vdash \sigma'$  and
  - If  $\exists \sigma'' \sigma \Vdash \varphi \Vdash \sigma''$ , then  $\sigma \Vdash \varphi \Vdash \sigma'$ , if  $\mathfrak{Z}(\sigma')$  is non-empty. Otherwise, the update fails.
  - If  $\exists \sigma'' \sigma \Vdash \varphi \Vdash \sigma''$ , then  $\sigma' = \langle 1(\sigma), 2(\sigma), 3(\sigma') \rangle = \{\epsilon' : \exists \epsilon \in \mathfrak{Z}(\sigma) \epsilon \Vdash \varphi \Vdash \epsilon'\}$ , if  $\mathfrak{Z}(\sigma')$  so defined is non-empty. Otherwise, the update fails.

On this definition, *yo* may be used felicitously only if the common ground has not established the proposition in its scope as an epistemic possibility. This condition could hold if the hearer had not considered  $\varphi$ ; it could also come about if the hearer believed  $\neg \varphi$ . But since I have not taken Corrections here into account, we will assume that if the hearer has such a belief it has not been entered into the

set of epistemic possibilities for the discourse; this assumption will be modified in what follows.

The semantics for *yo* is complex. First, *yo* asserts that the proposition in its scope is believed by the speaker to be something that the hearer should believe. Second, if we are still in a situation where the point of evaluation is an element of the set of epistemic possibilities, then *yo* $\phi$  is veridical forces an update on the evaluation point as well as the set of epistemic possibilities. If the epistemic possibilities have been already shifted say by a *might* operator, then we can no longer be sure that the evaluation point is in the set of epistemic possibilities; in this case, we just get a modal dependence of  $\phi$  on the prior epistemic possibilities. Whether we can prove the relevant facts about the evaluation point will depend on the discourse attachment of *yo* $\phi$ : if *yo* $\phi$  is attached to an element in the discourse context such that prior to it no modal shifting has taken place, then we predict a veridical reading. If modal shifting has already taken place, then we predict the modally subordinate reading. Of course the attachment in turn depends on several parameters as theories like SDRT make evident; this will be made explicit below.

How does this semantics account for the facts about *yo* discussed above? There, I discussed previous research showing that *yo* has the following properties: it is used to mark information that the speaker takes to be new to the hearer, it introduces the implication that accepting the content in question is in the interest of the hearer, and, in the case of imperatives, it produces effects of insistence and personal involvement.

The fact that *yo* is used to mark new information is encoded directly in the presupposition above; the proposition within its scope cannot be true throughout every epistemic possibility. This means that it hasn't been established yet in the common ground. This way of handling the new information requirement is somewhat

brutal; it would be nicer to make it follow from something else in the semantics.<sup>7</sup> For the purposes of this dissertation, however, I will stick with the presupposition.

The semantics for *yo* says that it revises the epistemic possibilities so that the proposition in its scope is true. That means that if the epistemic possibilities have been reset by a  $\diamond$  operator, then the  $\varphi$  will be understood as depending on the content of the propositions under the scope of the  $\diamond$  operator. On the other hand, if *yo* $\varphi$  attaches to a constituent in the discourse which does no such resetting and we have updated the initial context with only factual information, then in effect *yo*( $\varphi$ ) has a nonmodal and factive reading, for it in effect also requires the worlds of evaluation to reflect the fact that  $\varphi$ . That is, those elements  $\sigma$  will only pass through an update with *yo*( $\varphi$ ) in this case, if they also verify  $\varphi$ , which is what the data demands.

The effect of personal involvement comes, I argue, from the clause in the semantics that states that the hearer *should*, according to the speaker, believe the propositional content of the *yo*-sentence. The statement that someone should believe something ordinarily can be taken to indicate one of two things: either that that content has some relevance for that person, for instance if it is something that they are obligated to do or knowing which would benefit them, or else it is something that would benefit the speaker in some way. These are just the effects that arise from use of *yo*. The deontic modal statement in the semantics thus captures this effect.

The effects of insistence that make (4.5b) peculiar, however, do not yet follow from this semantics. As things stand, *yo* behaves like *might* if the world-assignment pair corresponding to the actual world does not support the proposition in its scope, and like an ordinary assertion otherwise. But, as we've seen, *yo*-sentences demand of the hearer that he believe the sentence's propositional content. Thus we need

---

<sup>7</sup>I make a suggestion about one way this might be achieved below, in footnote 9.



to make an additional distinction here between different types of unsupportedness: one type that requires a modal update, and one that asks the hearer to revise his information about the actual world. I will argue that it is this second type that produces the effect of insistence.

We now need to revise the semantics of  $yo$  to include a revision operation on the actual world. I see at least two ways to do this. The first is to demand a revision on the part of our models that corresponds to the actual world and assignment:  $\langle 1(\sigma), 2(\sigma) \rangle$ . The second is to reintroduce the condition we placed on the initial states of recursive epistemic possibility construction: that the world-assignment pair corresponding to the actual state of affairs is included in the set of epistemic possibilities, that is,  $\exists \sigma' \in \bigcup(3(\sigma_0)) (1(\sigma_0) = 1(\sigma') \wedge 2(\sigma_0) = 2(\sigma'))$ . I will take the first of these options, just because it makes the definitions (relatively) simple.

I will use the notion of *downdate* familiar from work in belief revision (cf. Gardenfors 1988), and implemented in SDRT using the operator  $\downarrow$ . This operator works on information states: it removes from them the information contained in the proposition in its scope. So  $\downarrow \varphi$  acts as an instruction to remove  $\varphi$  from the information state; this, of course, is the opposite of ordinary update, in that it removes information rather than adding it.<sup>8</sup> The idea for us then is that, when revising an information state that does not support  $\varphi$ , we first downdate with  $\neg\varphi$  and then update with  $\varphi$ . This guarantees that  $\varphi$  will be supported.

I now revise the definition of  $yo$  to incorporate this idea.

- Semantics of  $yo$  (second attempt):

---

<sup>8</sup>Additional complex issues arise in determining exactly what to remove from the information state in a case like this. For instance, suppose that information states are closed under logical consequence (a standard assumption) and that  $\varphi$  is present as the result of the premises  $\psi, \psi \rightarrow \varphi$  for some  $\psi$ . Now simply removing  $\varphi$  is problematic, resulting either in inconsistency or in  $\varphi$  coming right back from the implication. I will gloss over these issues in what follows as they would take us far afield.

- Presupposition of  $yo$ :  $\forall \epsilon \in \mathfrak{Z}(\sigma) : \langle \epsilon, \epsilon \rangle \models \mathcal{B}_S \neg \mathcal{B}_H \varphi$
- semantics as an imaging operator:  $\sigma \parallel yo(\varphi) \parallel^a \sigma'$  iff  $\sigma \parallel \mathcal{B}_S \text{should} \mathcal{B}_H \varphi \parallel \sigma'$  and
  - If  $\exists \sigma'' \sigma \parallel \varphi \parallel \sigma''$ , then  $\sigma \parallel \varphi \parallel \sigma'$ .
  - If  $\neg \exists \sigma'' \sigma \parallel \varphi \parallel \sigma''$ , then
    1. either  $\sigma' = \sigma'''$ , where  $\sigma \parallel \downarrow \neg \varphi; \varphi \parallel \sigma'''$ , or
    2.  $\sigma' = \langle 1(\sigma), 2(\sigma), 3(\sigma') \rangle = \{ \epsilon' : \exists \epsilon \in \mathfrak{Z}(\sigma) \epsilon \parallel \varphi \parallel \epsilon' \}$ , if  $\mathfrak{Z}(\sigma')$  so defined is non-empty. Otherwise, the update fails.

An additional complication is introduced here in that there are two possibilities for the interpretation of  $yo$  when update with  $\varphi$  is not supported. I will show how this should be determined in the next section; the facts are complicated and require a good deal of exposition. For the present, assume that clause 1 (downdate followed by update) is the default and is nearly always used. The next section will provide evidence for this claim and a detailed analysis.

Since  $yo$  demands the strong and destructive operation of revision and in addition is a marked form in comparison to a ‘bare’ assertion, its use implicates that the speaker has strong reason for using it—without such reasons a simple assertion would be enough. The sort of reason that is appropriate is to some degree context-dependent, but in the absence of further information (i.e. in the null context) the hearer is entitled to reason (by Gricean Quantity) that the speaker believes use of  $yo$  to be necessary—that is, the speaker expects that accepting the proposition will require some revision in the hearer’s information state. It is this pragmatic reasoning that produces the effects of personal involvement—for if the speaker didn’t care whether the hearer accepted the proposition, he would have no reason to try to force revision—and insistence—for the same reasons.<sup>9</sup> The same line of reasoning

---

<sup>9</sup>The same sort of reasoning might apply to the new information effect; why should a speaker use  $yo$  if he thought that the hearer already believes  $\varphi$ ? I will stick with the presupposition, however, as it seems to make the issues clearer.

also explains why *yo* is infelicitous when the speaker holds power over the hearer; in such a situation, she has no reason to try to force the hearer to accept what is being said, as it can be assumed that the hearer has to accept it anyway.

Given that *zo* has many of the same uses as *yo*, it is reasonable to analyze the two in a similar fashion. And, in fact, I will take the two to have an identical semantics. The perceived strength of *zo* I take to follow from sociolinguistic factors relating to register and tone.

#### 4.4 Modalization: when and how?

With this analysis of *yo* in place, we can proceed to consider the contrast discussed above: why the second sentence of (4.20) is interpreted as modalized, while the second sentence of (4.21) is asserted in the usual way.

(4.20)ookami-ga kuru kamosirenai.  $\emptyset$ /soitu anata-o taberu yo.  
 wolf-NOM come might  $\emptyset$ /that-guy you-ACC eat YO  
 ‘A wolf<sub>i</sub> might come in. It<sub>i</sub> (will) eat you first, man (rough gloss).’

(4.21)John-wa ima suupaa ni it-tei-ru nitigainai. soko-no  
 John-TOP now supermarket to go-PROG-NPST must. there-GEN  
 sake-wa totemo yasui n da yo  
 alcohol-TOP very cheap EMPH COP YO

‘John must be at the supermarket now. The liquor’s very cheap there, man.’

After exploring several options, we will ultimately pursue the hypothesis that this contrast is due to a difference in the *discourse relation* holding between the *yo*-sentences and the discourse constituents to which they are attached. This idea stems from the intuition that the two *yo*-sentences are said about different things. The second sentence of (4.23) is about the wolf whose existence is hypothetically asserted in the first sentence: the continuation describes what this wolf would do, if it does in fact come in. The second sentence of (4.24), however, involves no

such hypothetical content. The assertion of this sentence is about an object, the supermarket, whose existence is not in doubt. It is this difference in the *topic* of the discourse that causes the modalized interpretation of (4.23).

What does this difference amount to? Essentially just this. The facts about the price of alcohol in the supermarket do not depend in any way on whether John is present there or not. The assertion about pricing just provides background about the supermarket, or, more likely, an explanation of John’s presence there. The question of whether some hypothetical wolf will eat the addressee, however, is completely dependent on the presence of that wolf at a later point at which ‘eating you’ is a possibility. Otherwise stated, the wolf’s existence is a necessary condition for the eating event. It is this causal dependence—via requirements on discourse coherence—that induces the modal interpretations we are concerned with.

These differences can be understood as distinct speech acts; within SDRT, this idea is implemented using discourse relations. Specifically, the relation between the two propositions in (4.24) is one of *Background*, as the second proposition serves to give background for John’s presence in the supermarket;<sup>10</sup> and the relation between the propositions in (4.23) is something like *Narration*. In SDRT, *Narration* is computed using the following axiom:

- $(?(\alpha, \beta, \lambda) \wedge occasion(\alpha, \beta)) > Narration(\alpha, \beta, \lambda)$

Here,  $occasion(\alpha, \beta)$  indicates that the event mentioned in  $\alpha$  ‘occasions’ the event in  $\beta$  in the sense that there is a natural sequence of events in which  $\alpha$ -type events lead to  $\beta$ -type events. For our purposes, this notion can and must be strengthened to the idea that the  $\beta$ -type event *cannot* occur without the existence of an  $\alpha$ -type event; thus, the notion of ‘occasion’ I will assume is closer to the weak causation of Lewis (1973a). I will define a new version of the *occasion* predicate,  $occasion_C$

---

<sup>10</sup>The relation could also be argued to be *Explanation*. This distinction will not be important for what follows, as the crucial point is that no *occasion* relation holds between the propositions. See below for discussion.

‘causal occasion’, for use in the rest of the discussion.  $Occasion_C(p, q)$  holds just in case  $p$  is a weak cause for  $q$ , as stated in the following definition using standard modal logic:

- $occasion_C(p, q) \iff ((p \rightarrow \Diamond q) \wedge (\neg p \rightarrow \neg \Diamond q))$

That is, given  $p$  it is possible for  $q$  to occur, but if  $p$  is not the case then it is impossible for  $q$  to hold. This axiom describes rather well one’s intuitions about the relation holding between the two sentences in examples like (2.5).

In terms of analysis these differences can be implemented in several distinct ways. In what follows I will explore several possibilities: a purely pragmatic approach, a purely semantic approach (in a sense), and, finally, two mixed semantic and pragmatic approaches. The ultimate conclusion will be that an approach based on discourse relations is the most viable, because it is the only approach that allows for a fully compositional solution to the problem.

#### 4.4.1 Option 1: pragmatics

I will first try to use pragmatics exclusively. We have seen that  $yo$  is, in a sense, a ‘strong assertion’ operator; I implemented this intuition by making it a revision operator. This idea can be extended to the notion that  $yo$  tries to make the assertion as strong as possible while retaining coherence, where coherence is defined in the SDRT sense of resolving all underspecification, including that in the reference of pronouns and the identity of discourse relations. For the present case, this will amount to saying that  $yo$  works to maximize anaphora binding.

The idea then is that the meaning of  $yo$  is selected to avoid unbound variables. In the modal subordination examples, there is a pronoun in the second sentence that must be bound by the discourse referent under the scope of the first modal. If  $yo$  is not interpreted modally, the pronoun will be unbound, violating discourse coherence; on this analysis, this is the reason  $yo$  ‘goes modal’ in such examples.  $yo$  will only

integrate  $\varphi$  into the current information state by revising when there is no way to fix things up modally for coherence.

We can already see that this approach, by itself, will lead to problems. First, if unbound variables are enough to make *yo* go modal, then it should go modal in this example too (assuming a *de dicto* interpretation of the indefinite), because the null pronoun in the second sentence will be unbound.

- (4.22)a. ookami-ga kuru kamosirenai  
 wolf-nom come might  
 ‘A wolf might come in.’
- b. sokorahen ni  $\emptyset$  iru yo  
 over.there at exist YO  
 ‘There are some over there.’

But here the null pronoun only has a *de re* interpretation. Here we simply have an empirically wrong prediction.

Second, there are questions about how the constraint on coherence (against unbound variables) will interact with other pragmatic constraints. In particular, assertions generate implicatures toward the strongest statement possible. But, depending on how one defines informativity, it is always going to be stronger to make a nonmodal statement than a modal one. If this is correct (as it seems to be), *yo* should always choose to revise rather than go modal. But this is simply wrong.

#### 4.4.2 Option 2: semantics

Another option is to take a purely semantic approach. What I have in mind is using some kind of quantification in the semantics of *yo* itself. Specifically, the idea is to introduce a conditional statement: something along the lines of ‘if there is a modal statement of the form *might* $\varphi$  where  $\varphi$  occasions the proposition in the scope of *yo*, then interpret *yo* modally’. Here, *occasions* should be understood as ‘weakly causes’ in the sense described above. This move works with respect to our examples; since

an occasion relation can be inferred in the modal subordination example, a modal interpretation will result, and since there's no *occasion* relation in the supermarket example, we won't get the modal dependence there. But the semantics now looks remarkably construction-specific. Of course the modalization *is* in fact limited to just this sort of construction, but it would be nice for it to follow from something else; and it can be made to, as we will see below. I will therefore reject this simple kind of semantic account.

There is another peculiar thing about this kind of analysis. It makes the interpretation of an individual lexical item, *yo*, dependent on completely nonlocal factors: the presence of a modal operator modifying some variable binder at an earlier point in the discourse, where the discourse constituent containing the variable binder stands in a particular relation to what *yo* modifies. Such an analysis is not in any way compositional, which is not a good thing. Problems like this are not limited to *yo*, either; in fact, we will see compositionality issues arise again and again through our exploration of particle semantics in the next chapter.

### 4.4.3 Option 3: semantics/pragmatics

The next option I will try out is combining semantic and pragmatic ideas. This seems plausible; given that *yo* has effects in both domains, it would be unsurprising if both kinds of information had effects on its meaning. I see two main possibilities within this kind of approach: one based on (discourse) topic, and one based on the SDRT notion of discourse relations.

#### Option 3.1: topic

I still have the intuition that there is a topic-based distinction here. Consider our familiar examples again. In (4.23), The first sentence is about a hypothetical wolf; so is the second sentence. Because the second sentence further elaborates on facts

about the hypothetical wolf, *yo* goes modal.

- (4.23) ookami-ga kuru kamosirenai.  $\emptyset$ /soitu anata-o taberu yo.  
wolf-NOM come might  $\emptyset$ /that-guy you-ACC eat YO  
'A wolf<sub>i</sub> might come in. It<sub>i</sub> (will) eat you first, man (rough gloss).'

In (4.24), however, the first sentence could be about several different things—John, the supermarket, . . . But the second sentence is clearly about the supermarket, which actually exists. Because of this, *yo* is not interpreted modally.

- (4.24) John-wa ima suupaa ni it-tei-ru nitigainai. soko-no  
John-TOP now supermarket to go-PROG-NPST must. there-GEN  
sake-wa totemo yasui n da yo  
alcohol-TOP very cheap EMPH COP YO  
'John must be at the supermarket now. The liquor's very cheap there, man.'

If this notion of 'aboutness' can be correlated with some formal idea of topic a principled explanation might be forthcoming. Now I would like to sketch how such an analysis might go in SDRT, and show why it would not solve the compositionality problem.

In SDRT, topic construction works by use of a special discourse relation, which I will call *Topic*.<sup>11</sup> The *Topic* relation abstracts out the content of particular speech acts and provides an additional site for discourse attachment. The idea for us would be that a modal speech act (roughly speaking) could in principle introduce several distinct topics, one modal, as in (4.23), and one not, as in (4.24). Depending on which topic was chosen as the attachment site, a modal or non-modal interpretation for *yo* would result.

But this kind of analysis runs into the same sort of problem as the semantic story above. We would have to make the interpretation of *yo* fully dependent on a nonlocal operator; this is not compositional. Thus, although the topic story is

---

<sup>11</sup>Asher and Lascarides (2003) use the symbol  $\Downarrow$  for it, but *Topic* has mnemonic advantages.



founded on a (somewhat) more explanatory foundation, it runs into theoretical problems in its implementation. I therefore will not adopt this approach either.

### **Option 3.2: discourse relations**

We could make the interpretation of *yo* dependent on the particular discourse relation inferred between the modal constituent and the *yo*-constituent by defining a special discourse relation. Let us hypothetically define such a relation and name it *Depyo*, for *dependent yo*. The conditions for inferring  $Depyo(\pi, \pi')$  would be similar to those for the semantic rule above:  $\pi$  must be modal and contain a discourse referent,  $\pi'$  must be occasioned by the proposition in the scope of the modal  $\pi$  labels and itself label a proposition modified by *yo*. The semantics of *Depyo* would then induce a modal interpretation on *yo*. I see several problems with this sort of solution; nonetheless, as I will show, a version of it, together with some additional assumptions, solves the compositionality problem.

Let me briefly mention the problems I see. First, it is just as construction-specific as putting the rule directly into in the *yo* semantics; but, as I suggested in the previous section, the modalized interpretation of *yo* is in fact limited to just these constructions, so this issue may not be too major. Second, I don't see that it makes formal sense to have the *interpretation* of a lexical item depend on the discourse relation in the sense I am pointing to here. Within SDRT there is work on how particular lexical items are disambiguated by discourse information; certain discourse contexts, for instance, favor the 'riverbank' interpretation of *bank* over the 'financial institution' interpretation. But disambiguation of this sort is quite different from the *yo* case, because in the bank-type cases it is world knowledge that does the disambiguation (in general), while in the *yo* case the modal interpretation comes from purely semantic and structural factors. This means that compositionality is again an issue for this sort of analysis. This objection is more cogent. Still, there

are technical means around the problem, as I will show shortly. Third, even if one chooses to ignore compositionality issues, it is not clear how the discourse relation itself could influence the meaning of *yo*, given the SDRT schema for interpretation, in which a (veridical) formula of the form  $R(\alpha, \beta)$  is interpreted dynamically as follows:  $\alpha; \beta; \phi_R$ , where  $\phi_R$  indicates content coming from the discourse relation. Since  $\beta$  is interpreted strictly prior to the discourse relation content, it is difficult to see how such content could have an impact on the interpretation of lexical items contained in  $\beta$ . It is possible, of course, to leave certain items underspecified until the discourse relation comes in; and, in fact, this is precisely the solution I will explore.

#### 4.4.4 An underspecified semantics for *yo* and *zo*

Since I am assuming SDRT, I will make use of the SDRT approach to underspecification.<sup>12</sup> Since the full picture is quite complicated, I will refrain from giving all the details of this approach here, instead giving only enough background to make the picture of how discourse relations interact with the *yo* semantics clear; for the full treatment, see Asher and Lascarides (2003). The basic idea is that, instead of specifying multiple complete logical forms for ambiguous expressions, one can utilize a description language over labels that tag bits of semantic content and specify certain restrictions on the relations the labels hold to one another. With these restrictions and a language for reasoning about the descriptions themselves, it is possible to produce *underspecified* logical forms (ULFs), which themselves do not have a single interpretation. However, ULFs (together with the restrictions on them) are verified only by models which verify one or another of the fully specified logical forms that they correspond to. The end result is a single partially specified logical form that, in a sense, contains within it the seeds of several distinct logical formulas.

---

<sup>12</sup>See also e.g. Reyle (1993) or Bos (1995) for other realizations of the general underspecification approach.

Technically, this result is achieved by making each element of a formula into a predicate over labels: each such formula has arity of one greater than the original. Thus, a formula of the form, for instance,  $go(john)$  is translated into the more complex formula  $R_{go}(l_j, l) \wedge R_{john}(l_j)$ . Restrictions on the relative scoping between the labels can be introduced using a relation *outscopes*; for instance, for a sentence involving a sentential adverbial such as *Probably John went*, the adverbial can be guaranteed scope over the sentence by the condition  $outscopes(l_p, l)$ , where  $l_p$  is the label corresponding to the adverbial and  $l$  labels the formula  $went(john)$ . In what follows, I will abstract away from representation of the labels when they do not play a crucial role in the semantics: thus, I will often write e.g.  $\varphi$  for  $R_\varphi(l_\varphi)$ .

Underspecification is more flexible than this scope-oriented discussion suggests, however. It can be used even to provide multiple meanings for lexical items without resorting to oft-used devices like disjunction or defining multiple homophones. A lexical item can be stated as a relation between labels and predicates with multiple distinct realizations. Other contextual information (broadly defined; information about the meaning of other lexical items and the sorts of objects they select for, as in the *co-composition* of Pustejovsky 1995) can then pick out one predicate or the other, effectively disambiguating the sentence. I will make use of this device in defining the *yo* semantics.

But first, two preliminary steps. First, I will define a predicate which will be used in the semantics, *SAssert*, “strong-assert”. Intuitively, this predicate is understood as ‘assert at all costs;’ applied to a proposition, it has no effect if an assertion with the predicate is possible, but if update with the proposition results in failure, it forces a revision of the input information state so that such an update becomes possible. These elements will be familiar from the earlier versions of the *yo* semantics I provided but will be made use of in a slightly different way here.

- $\sigma \parallel Sassert(\varphi) \parallel^a \sigma'$  iff

- if  $1(\sigma) \in \bigcup 3(\sigma)$ , then  $\sigma \parallel \varphi \parallel \sigma'$ , and
- iff  $1(\sigma) \notin \bigcup 3(\sigma)$ , then  $\sigma' = \sigma'''$ , where  $\sigma \parallel \downarrow \neg\varphi; \varphi \parallel \sigma'''$ .

The second element needed is a discourse relation that is triggered in contexts in which an utterance is semantically dependent on another modal one. These are, of course, the contexts in which *yo* goes modal. I will call this relation *Dep*.

- $\langle \alpha, \beta, \gamma \rangle \wedge \text{Epist\_mod}(\alpha) \wedge \text{occasion}_C(\alpha, \beta) > \text{Dep}(\alpha, \beta)$

Now we can proceed to define the meaning of *yo* using an underspecified semantics. This project is somewhat complicated. I will take the predicate *yo* itself to be uninterpreted in the sense of not being defined directly in the semantics, but as serving as a placeholder for two other possible relations, as reflected in the notation I use, writing  $yo?$ . To resolve this formula to a particular form of *yo*, we must consider various contextual factors, to wit, the following rules. The first rule states, in words, that if  $yo?$  stands in relation to some formula and is labeled by a label  $l$ , and all that content is labelled by a speech act referent  $\pi$  which is connected to some other referent by *Dep*, then  $yo?$  is resolved to  $yo_\diamond$ . If there is no such relation, then  $yo?$  is resolved to  $yo_{\text{assert}}$ .

- Rules for *yo* meanings:
- $\exists \pi' \exists R [yo?(\varphi, l) \wedge R(l, \pi) \wedge \text{Dep}(\pi', \pi) > yo_\diamond(\varphi, l)$
- $\exists \pi' \exists R [yo?(\varphi, 1) \wedge R(l, \pi) \wedge \neg \text{Dep}(\pi', \pi) > yo_{\text{assert}}(\varphi, l)$

Given these two rules, the consequence relation of SDRT underspecified logical forms will always verify that *yo* either is assertive or modal, which is as desired.

We can bring this discussion together and give what will be my final version of a semantics for *yo*, as follows.

- Final semantics for *yo* (for underspecified semantics):

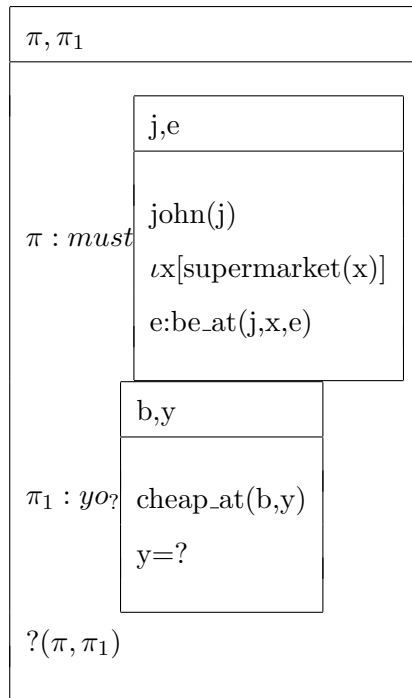
- Presupposition of *yo*:  $\forall \epsilon \in \mathfrak{Z}(\sigma) : \langle \epsilon, \epsilon \rangle \models \mathcal{B}_S \neg \mathcal{B}_H \varphi$
- Semantics of *yo*:  $\sigma \|\mathcal{B}_S \text{should} \mathcal{B}_H \varphi\| \sigma'$  and
  - $\sigma \|\text{yo}_{\text{sassert}}(\varphi)\| \sigma'$  iff  $\sigma \|\text{sassert}(\varphi)\| \sigma'$
  - $\sigma \|\text{yo}_{\diamond}(\varphi)\| \sigma'$  iff  $\sigma \|\text{might}(\varphi)\| \sigma'$

Ultimately, what I have done here is to move the relevance of *occasion<sub>C</sub>* into the semantics of the discourse relations rather than trying to put it directly into the *yo* semantics itself. This move preserves compositionality and also results in a much simpler and cleaner semantics for the particle itself.

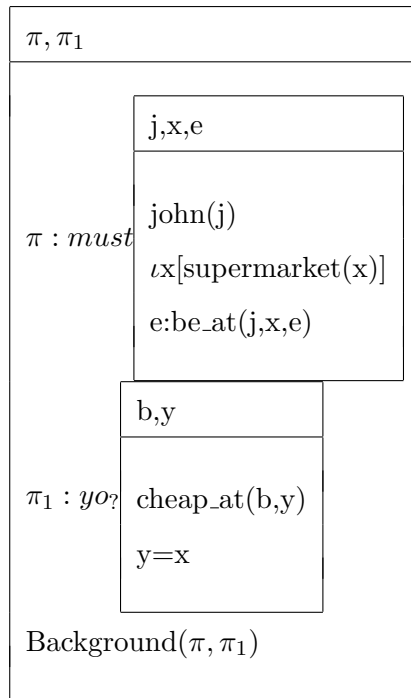
Let me now apply the same idea to redefining the semantics of *zo*. This project can be carried out in more or less the same way as that for *yo* above. I show the lexical entry for completeness; but note that we also need default rules involving *Dep*, just as for *yo*. Since these rules are identical to those for *yo*, I will not write them out.

- Final semantics for *zo* (for underspecified semantics):
- presupposition of *zo*:
 
$$\forall \epsilon \in \mathfrak{Z}(\sigma) \langle \epsilon, \epsilon \rangle \models_r \mathcal{B}_S \neg \mathcal{B}_H \varphi$$
- Semantics of *zo*:  $\sigma \|\mathcal{B}_S \text{should} \mathcal{B}_H \varphi\| \sigma'$  and
  - $\sigma \|\text{zo}_{\text{sassert}}(\varphi)\| \sigma'$  iff  $\sigma \|\text{sassert}(\varphi)\| \sigma'$
  - $\sigma \|\text{zo}_{\diamond}(\varphi)\| \sigma'$  iff  $\sigma \|\text{might}(\varphi)\| \sigma'$

Let's now see how this analysis works out in concrete cases of the two types of *yo* I set out to distinguish. I will not show how the analysis works with *zo* examples, because nothing of interest changes from the *yo* case. I begin with (4.24), the nonmodalized case, which gets the following SDRT representation.

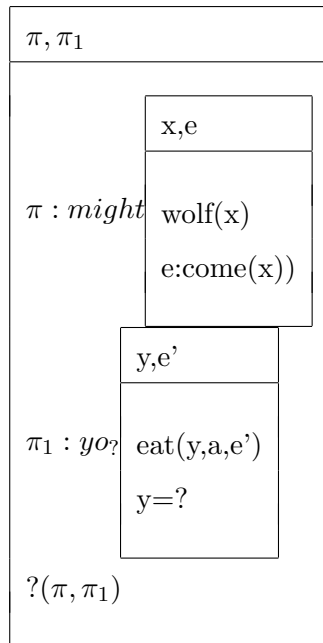


The presupposition of the definite determiner (here translated as  $\iota x$ ) will project out in the standard way (Beaver, 2002); the treatment of presupposition in SDRT is somewhat complicated and anyway is orthogonal to my discussion here. For this reason, I will leave the presupposition unresolved in the scope of the modal, although if things were made fully explicit it would scope out. This SDRS contains an underspecified discourse relation, that holding between  $\pi$  and  $\pi_1$ . The conditions for resolving  $?$  to *Background* are met, so  $?$  is resolved to *Background*, yielding:

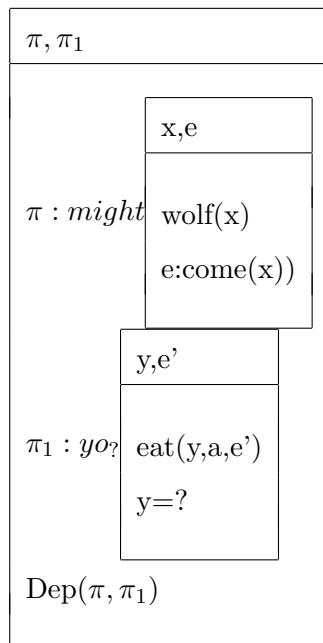


Now, since *Dep* does not hold between the two speech act discourse referents, *yo?* in the semantics of the SDRS is resolved to *yo<sub>sassert</sub>*, and no modal dependencies are licensed. Rather, the content of  $\pi_1$  is interpreted as a simple assertion, if the interpreter's information state supports the content 'beer is cheap at that supermarket'; otherwise, the interpreter's IS is downdated with the negation of that statement, and re-updated, so that the hearer comes to believe the truth of the content of  $\pi_1$ .

Now, however, consider the SDRS for (4.23). Here, the modalized antecedent does not contain any presupposition triggers, and so no further steps need to be taken to process the information content. The symbol *a* is used to denote the addressee of the utterance ('you').



The relation  $?$  holding between  $\pi$  and  $\pi'$  can be resolved to *Dep*, given how conditions on inferring that relation were defined. Performing this operation yields the following SDRS:





And, now that *Dep* is present in the SDRS, the underspecified semantics allows for  $yo?$  to be resolved to  $yo_{\diamond}$ . This means that the content of  $\pi_1$  is interpreted just as if  $yo?$  was a *might* operator; as a result, modal subordination becomes possible, and the variable  $y$  can be resolved to  $x$ . The effect produced is identical to that of modal subordination with modals, but the means is quite different, here something close to a pragmatic mechanism rather than a purely semantic one in the sense that the move to other possible worlds is made in order to forestall incoherence at the discourse level.

One point of possible interest in this analysis is the shift away from the purely structural analysis of constraints on anaphora found in DRT and theories like SDRT that are based on it. In DRT, anaphoric expressions (variables) can be bound only when the structural constraints described in the earlier section on DRT are met; enabling anaphoric dependence in other situations requires either structural revision (like the copying operation of Roberts) or alterations to the anaphoric constraints (as made by e.g. Frank). In contrast to these approaches, I have allowed a ‘hybrid’ model of anaphora in the sense that anaphoric dependence is made possible by the semantics of particular expressions, such as  $yo$ , without need for structural change. I think that this move is desirable in that it corresponds to intuitions about how binding takes place in examples like this, and eliminates the need for *ad hoc* structural operations, and indeed in modal subordination more generally; I do not at present see domains other than modal subordination (and possibly quantificational subordination) to which this sort of model can be extended; however, as we will see in the next chapter, the kind of analysis I have given here is useful for particles in English as well as for Japanese.

## 4.5 A complication

The following example raises a complication for my analysis. The difference between this and earlier examples is that the second sentence contains an overtly expressed modal.

- (4.25)ookami-ga kuru kamosirenai.  $\emptyset$  anta-o taberu kamosirenai yo  
 wolf-NOM come might you-ACC eat might YO  
 ‘A wolf might come in. It might eat you first, man.’

Here, *yo* is not interpreted modally. Rather, it emphasizes the second (modal) assertion in the way described by *Sassert*. But as the analysis stands, the instance of *yo* here should be interpreted modally, because the conditions for a modal interpretation are met: *Dep* holds between the two constituents and the first sentence contains a modal. How should this case be integrated into the analysis?

### Complicating the licensing rules

The solution I will adopt is to add another licensing rule, complicating the set to:

1.  $\exists \pi' \exists R [yo_?(\varphi, l) \wedge R(l, \pi) \wedge Dep(\pi', \pi) > yo_{\diamond}(\varphi, l)$   
 i.e. if there is a modalized discourse segment that stands in the *Dep* relation to the segment containing *yo*,  $yo = yo_{\diamond}$ .
2.  $\exists \pi' \exists R [yo_?(\varphi, 1) \wedge R(l, \pi) > yo_{sassert}(\varphi, l)$   
 i.e. if there is no such segment, then  $yo = yo_{sassert}$ .
3.  $\exists \pi' \exists R [yo_?(\varphi, l) \wedge R(l, \pi) \wedge Dep(\pi', \pi) \wedge modal(\varphi, l') \wedge outscopes(l, l') > yo_{sassert}(\varphi, l)$   
 i.e. if there is a modalized discourse segment that stands in the *Dep* relation to the segment containing *yo* and *yo* applies to a modalized proposition,  $yo = yo_{sassert}$ .

In the  $>$  logic, the more specific antecedent ‘wins’ when there is more than one rule that can be satisfied in a given situation and their consequents are inconsistent (Asher and Morreau, 1991; Asher and Lascarides, 2003), where ‘most specific’ is understood in the sense of containing the largest number of clauses. Here, the specificity of the antecedent rises as we go down the ruleset, so the addition of the third rule will make the facts work out.

This situation falls into a more general picture of licensing operations. We find many cases in language where a given object or configuration can license a linguistic object, but where adding additional factors can ‘de-license’ the object. The case of *yo* with modals is just one of these. And, in fact, the ruleset provided here can be viewed as a particularized use of a more general technique to formally model licensing relations in language, though I will not explore these issues further here.

#### 4.5.1 Null modals

The analysis I propose, of course, is not the only possibility. Here I would like to mention another possible analysis: that *yo* is not itself modal but simply licenses a null modal in *Dep*-type contexts (suggestion due to Rajesh Bhatt). This sort of analysis would get the rest of the facts right, and also would explain why no modal interpretation arises in the presence of another modal: in such a case, there is simply no position available to add a null modal (since Japanese modals do not stack).

Null modals are known to exist in other contexts, as in Hindi, where they are licensed by habitual mood following a counterfactual conditional (example from McCready and Reese (2002)).

- (4.26)a.    agar Mary-ke paas microwave hotii,    to    vo us-kaa kabhii prayog  
           if    Mary    near microwave be-Hab, then she its    ever    use  
           naa kartii.  
           Neg do-Hab.f.

‘If Mary had a microwave, she would never have used it.’

- b. vo us-ko drawing room me rakh detii. us-ke paRosii  
she it-ACC drawing room in keep give-Hab.f. she-GEN neighbors  
microwave-ko nihaarte.  
microwave-ACC admire-Hab.M.  
‘She would have kept it in the drawing room. Her neighbors would have  
admired it.’

One nice feature of this analysis is that may be possible to apply it also to puzzling facts about Japanese past tense. In Japanese, one finds instances of past tense used in situations where a past situation is not being talked about. For instance, in the following example, it is not the case that the speaker has already bought the watermelon; rather, he uses his utterance, which is in the past tense, to buy the watermelon. One might understand this situation to mark use of a null modal.

- (4.27)a. Context: I see a nice-looking watermelon at the market and decide to  
buy it.
- b. kat-ta!  
buy-pst  
‘I’ll take it! (lit. I bought it!)’

This is speculative, however, and I cannot do justice to these facts here. And, in fact, I think there is evidence from English that the underspecification analysis is in fact preferable to the null modal analysis. The facts I have in mind relate to the English particle *man* in its sentence-final use. I will turn to this particle and related issues in the next chapter.

## Chapter 5

# Emotives in English

This chapter continues the analysis of particles begun in the previous chapter. Chapter 3 considered the particles *yo* and *zo* in Japanese. In the present chapter, I will discuss the semantics of some of the particles found in English: in particular, *man* and its semantic kin, and the expletives. As we will see, the interpretation of these particles varies a great deal depending on whether they appear sentence-initially or sentence-finally; this is true, at least, for the *man*-type particles; expletives do not have a sentence-final use.

In the first part of the chapter, I will provide data relating to sentence-final *man*, and then give a semantic analysis. Section 4.2 examines the distribution and meaning of *man*-type particles when used sentence-initially. Section 4 discusses the expletives. Finally, in section 5, I give a formal analysis of the data.

### 5.1 Semantic properties of sentence-final emotives

The previous chapter observed that sentence-final particles in Japanese can license modal subordination even in the absence of any (other) modal operator. It was also shown that the use of *yo* introduced pragmatic effects of insistence and, in some

cases, doubt about the interlocutor's willingness to accept the asserted proposition, in the case of statements, or to perform the action requested by the speaker, in the case of commands. One may now wonder about the extent to which similar phenomena can be found across languages. The present section considers data from English that shows that, at least in one class of case, sentences including the nouns *man* and *dude* when used as adjuncts exhibit properties similar to *yo*-sentences.

The particular class of sentences we will consider are those in which *man* or *dude* is used sentence-finally; thus, sentences like (5.1a). We will not consider sentence-initial uses of *man/dude* like that in (5.1b) in this section; however, they seem to act as calls to the listener for attention or as emphasis of a somewhat different sort to that in the sentence-final cases.

(5.1) a. John's at the store, man.

b. Man, I know that!

I do not find any significant differences between *man*, *dude*, or other words with similar distribution (*G*, *yo*, *bro*, *brother*, *dog/dawg*, *girl* and, in British or Jamaican dialects, *boy/bwoy*), at least in sentence-final uses; we will see later that sentence-initial uses of these particles are not interchangeable.<sup>12</sup> For this reason, the discussion to follow will focus exclusively on examples with *man*. I believe that it generalizes fully to the other forms mentioned.

I will discuss two properties of these sentence-final forms, each of which is shared (in my judgement) with Japanese *yo*. The two properties are giving a sense of insistence and licensing modal subordination. We will see that some differences arise in the case of modal subordination, but that they can be put down to other

---

<sup>1</sup>English *yo* may also be different in that it is not clearly a nominal but is more likely some sort of interjective particle. It does appear to have similar semantic effects to the nominal forms, however, and I think it is appropriate to include it here.

<sup>2</sup>I should also note that the gender-specificity of *man* seems to be bleached in this context. For many speakers, it is perfectly possible to address a female with sentences like '... , man', although some speakers resist this.

aspects of the grammatical systems of the two languages, meaning that we can give a uniform semantics for both *yo* and *man*.

### 5.1.1 Insistence

I showed above that use of *yo* produces an effect of insistence when used in commands, as in (5.2).

- (5.2) *biiru katte-ki-te yo*  
beer buy-come-IMP YO  
'Go buy some beer, man!'

As suggested by the gloss in (5.2), use of sentence-final *man* produces a similar effect.

- (5.3) a. Go buy some beer.  
b. Go buy some beer, man.

I also showed above that use of *yo* in declarative sentences gives a sense that the speaker has a personal stake of some sort in the hearer's accepting the proposition the sentence expresses. In a sense, this is an assertive variant of the insistence effect in imperatives. The same effect can be seen with *man*; using sentence-final *man* in a declarative sentence gives the feeling that the speaker has a desire for the hearer to accept the propositional content beyond what is needed just for the ordinary assertion.

- (5.4) a. You don't need that.  
b. You don't need that, man. (insistent/pushy)

- (5.5) a. John came to the party.  
b. John came to the party, man. (assumes doubt on part of hearer)

The upshot of this discussion is that Japanese *yo* and English *man* (and *dude*, *G*, etc.) share the properties of producing pragmatic effects of insistence and speaker involvement. We now see that particles like *yo* are not unique to Japanese, but show up in other languages as well. Further confirmation is provided by the facts about modal subordination seen in the following subsection.

### 5.1.2 Modal subordination, *man*

We have seen that *yo* can facilitate modal subordination, even in the absence of a true modal in the second sentence of the two-sentence discourses we considered. As it turns out, *man* is weaker than this: it cannot license modal subordination by itself. What it can do, though, is make modal subordination work out even when the ‘wrong’ type of modal is used.

Clearly, *man* cannot license modal subordination when no other modal is present.

(5.6) A wolf might walk in. # It eats you first, *man*.

(5.7) A wolf might walk in. # It ate you first, *man*.

A first hypothesis is that what we are dealing with here may simply be a problem of fixing the times correctly. As is well known, the English modal *might* induces a temporal shift forward when its complement is eventive (Condoravdi, 2002; McCready, 2003). This means that the first sentence of these discourses is interpreted as futurate from the perspective of the utterance time. As a result, the hypothetical wolf only walks in at a point later than the evaluation time of the sentence, which here is concurrent with utterance time because the sentence is discourse-initial.

The present tense used in the second sentence of (5.6), however, is indexical and forces the sentence to be evaluated at the utterance time when used in matrix



clauses (Smith, 1997; Schlenker, 2003). Thus we simply have a temporal mismatch. The problem with (5.7) is similar but even worse; here the past tense requires the second sentence to be interpreted at a point strictly before the time of evaluation of the first sentence, which here is concurrent with the utterance time. At both utterance time and times previous to the utterance time, there is no wolf that has been asserted to hypothetically exist; so the discourses are infelicitous regardless of the presence of *man*. A parallel example would involve past tense under a true modal:

(5.8) A wolf might walk in. # It might have eaten you first.

Here the discourse is incoherent regardless of the presence of the modal due to mismatches with world knowledge, so even if the modal element of *man* is the same as *yo*, licensing is impossible. One possible hypothesis about the difference seen here between English and Japanese is that this problem did not arise with Japanese because of the nature of the Japanese tense system. As discussed briefly in chapter 2, Japanese has only two options for tenses, past and nonpast, so when nonpast tense is used a future interpretation is possible. As a result *yo* was able to make the discourses felicitous by itself. This explanation seems to get the data so far right.

But, in the end, the tense story doesn't work out. Consider the discourse in (5.9).

(5.9) A wolf might have come in. # It ate you first, man

Here the tenses clearly match, but subordination is still impossible. This suggests that it can't be the tenses that are causing the problem here.

Since the tense-based account proves not to be right, let us concentrate on discourses including a future auxiliary in the second sentence, like those in (5.10); discourses like these clearly are improved by *man*. By restricting our attention to

these discourses, we can work on determining what it is about *man* that makes modal subordination possible when it does, as opposed to spending time looking at cases which may be out for completely different reasons.

(5.10)a. A wolf might walk in. ? It will eat you first.

b. A wolf might walk in. It will eat you first, man.

Judgements on discourses like (5.10a) that involve only future auxiliaries in the continuing sentence are not totally consistent across speakers, but they are certainly worse than corresponding examples with true modals like *might* or *would*. To see what *man* is doing here, we first must consider the meaning of *will*. The reason presumably is that *will*, although it does have a modal flavor in the sense of uncertainty about the future,<sup>3</sup> restricts attention in some sense to the actual world. Use of *man*, however, makes the discourse totally felicitous, which shows that *man* introduces the possibility of searching more remote possible worlds for one in which the proposition in question is true and an antecedent is available. Thus we find that *man* does have a modal flavor in contexts involving weak causation, which can be modelled using a strong version of the *occasion* predicate, as shown in the last section.

We first need a semantics for *will*, however. I will analyze *will* as a quantifier over branching futures. The idea here is that the semantics of the future should be stated in terms of possible worlds; at each temporal point in the future at which it is possible that some event happens, a new sequence of possible worlds (or possibly several) comes into existence, one for each possible realization the event had. These sequences represent possible futures. For instance, suppose (reasonably enough) that it may rain tomorrow. Then for each point in the day, there are two distinct possibilities: one at which it rains, and one at which it does not. Each of these pos-

---

<sup>3</sup>Much research has also argued that future auxiliaries like *will* are both syntactically and semantically more like modals than like tenses; see e.g. Enc (1987).

sibilities is represented in a branching-futures model as a new world-line. Formally, this idea is understood in standard modal logic as a set of states with accessibility relation  $R$ , as usual; the special property of branching-time models is that they take the form of trees, in that any substructure of the model has a root (an initial point representing a (past) point at which the future was determinate).

Consider now how this model works with *will*. I will take the following sentence as a test case. Imagine a situation in which we plan to picnic at the lake tomorrow, but won't go if it rains; and there is a fairly good chance that it will in fact rain, let's say 30%.

(5.11) We will have a picnic tomorrow.

This sentence might be true or false depending on how one chooses to interpret *will*. It clearly is not the case that there is *certain* to be a picnic tomorrow; if it rains, there won't be. So the sentence, in one sense, is false. This reading of *will* corresponds to something like *will inevitably*; as Thomason (1984) says, this meaning corresponds to an analysis of *will* on which the proposition it applies to must hold for *all* temporal branches, a reading something like 'will inevitably' or 'certainly will'. The reason for this falsity, on this semantics, is that it does not hold that for all possible futures a picnic happens; if it rains, there will be no picnic. It is also possible, however, to interpret the sentence as true, in my judgement; the reason is that we intend to have a picnic and, most likely, will, given that the chance of rain is relatively low. This reading corresponds to an interpretation of *will* on which the proposition in its scope must hold only in *some* temporal branch; since there are branches in which we have a picnic (those in which it doesn't rain), the sentence comes out true. I will use this existential interpretation of *will* in the semantics that follows.

I will now formally define the branching time model, by adding it to the dynamic theory already developed. This will be straightforward: we need only

add an additional element to the models, a temporal parameter. I will do this by complicating the world element of our epistemic possibilities,  $2(\sigma)$ , from a world to a world-time pair. I assume a simple point-based semantics for times; so  $T$  is a partially ordered set of temporal instants.<sup>4</sup> This is the only alteration that needs to be made to the models; since I have just augmented  $2(\sigma)$  with a temporal parameter, the truth definitions can remain the same.

At this point the temporal part of the model is just a partially ordered set of instants, as stated. In order to make this into a branching time model we need to ensure that the ordering has some other properties, as follows. I use  $\leq$  for the ordering. The following definitions rely heavily on Landman (1990). ‘ $n$ ’ in axiom 3 refers to the present instant, *now*.

1. Rootedness:  $\exists t[t \in T \wedge \forall t'[t' \in T \rightarrow t \leq t']$
2. Density:  $\forall t, t'[t < t' \rightarrow \exists t''[t < t'' < t']]$
3. Nonbranchingness in past:  $\forall t, t'[t < n \wedge t' < n \rightarrow (t \leq t' \vee t' \leq t)]$
4. Infinite future:  $\forall t \exists t'[t' > t]$

These axioms fall into two types: axioms that ensure something about the general structure of time (Axioms 2 and 4), and axioms that force the right kind of branchingness in the model (Axioms 1 and 3). Axiom 1 ensures that the branching time model is tree-like in the sense of having a point that precedes all others. Axiom 2 ensures that the order is dense: any pair of instants is separated by another. Axiom 3 makes only the future indeterminate: the past is a strict linear order. Axiom 4 ensures that time is infinite.

Now that we have the right structure on  $T$ , I will define the semantics of *will*. This semantics makes no reference to epistemic possibilities; it is compatible with any semantics that has quantification over times.

---

<sup>4</sup>One could easily use an interval-based semantics, but I will stick to instants to keep things simple.

- $\llbracket will \rrbracket = \lambda p. [will(p)]$
- $\sigma \Vdash will(p) \Vdash \sigma'$  iff  $\exists t > n[p$  is true at  $t]$

Thus *will* is defined as an operator over propositions, true if there is some temporal branch that verifies the proposition (for epistemic states in  $\sigma$ ). Note that the truth conditions here are very weak; there need only be some time on some branch that verifies  $\varphi$ . Arguably, as discussed above, *will* on one reading serves as a universal quantifier over branches, so that for every branch the proposition holds at some instant (the ‘Peircean’ view); I will however follow Prior (1967) and Thomason (1984) in taking the alternative, ‘Ockhamist’, view, on which a single branch is enough. This choice is not crucial for what follows.

Now I return to modal subordination. I want here to pursue the hypothesis that *man* licenses modal subordination with *will* because *man* is able to coerce *will* into quantifying over *epistemic* states, rather than *future* states. The formal details of this idea will be given in the following section.

We now turn to a formal analysis of sentence-final *man*.

### 5.1.3 Analyzing sentence-final *man*

We have seen that *man* has similar effects to Japanese *yo*, both semantically and pragmatically. This suggests that it should be given a similar semantics. However, one aspect of the meaning of *yo* has not yet been considered with respect to *man*: the requirement of *yo* for new information. How does English *man* stack up in this area?

Consider first the Japanese sentence in (5.12a). Because agents can be expected to have a good idea of the state of their own mental processes, this sentence is infelicitous in general; the speaker is not providing any new information here. The only circumstance in which it is felicitously usable is one in which the speaker has reason to believe that the hearer isn’t aware of his own intelligence; one imagines

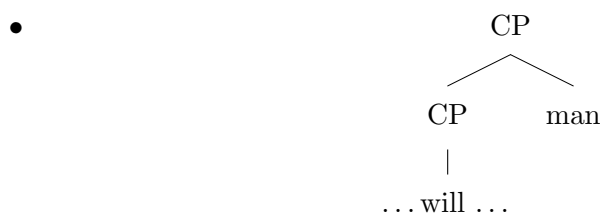
a B-movie context with a dialogue between two high school students, one trying to convince the other to go to college. The corresponding English sentence (5.12b), however, seems to me good quite generally. In my judgement, one doesn't need to do much work to come up with a special context in which this sentence can be used (although, of course, some contexts are more reasonable than others, just as with any other sentence). This intuition leads to the conclusion that *man* in fact lacks the new information requirement of *yo*.

- (5.12)a. # Omae-wa kekkoo atama ii yo  
           you-top pretty head good YO  
           ‘You’re pretty smart, man.’
- b. You’re pretty smart, man.

The semantics we seem to need now is one that preserves the revision operation associated with *yo*, and the possibility of conducting this revision in worlds other than the actual just in case *will* is present; but one that does not make any requirements as to the novelty of the information conveyed. This requirement was modelled above as a presupposition on use of *yo*. Thus, *man* can be taken to mean something similar to *yo*, but to presuppose nothing. We can thus, as a first approximation, analyze *man* using the *yo* semantics I developed in the previous chapter, but without any presupposition. Such a semantics will give the same results for speaker involvement/insistence and modal subordination as that for *yo*, as the reader can easily verify by comparing the discussion of *yo* above; it will not, however, put any constraints on the sorts of information that *man* can apply to. This is as desired.

There are still complications here. We need to decide whether or not to use the underspecification approach developed in the last chapter. This semantics is somewhat complicated, and it is at least possible that we can get away with using the fully specified version of the *yo* semantics. To determine this, we must figure out the answer to this question: in what circumstances does *man* go modal? We

have seen that *man* requires the presence of *will* for a modal interpretation—the evidence for this claim is that *man* cannot license modal subordination when *will* is not present. I suggested above that *man* modifies *will* so that it quantifies over epistemic possibilities rather than possible futures. But trying to work this out directly will lead to problems with compositionality again: since *man* is an adjunct that modifies the proposition denoted by the rest of the sentence, *will* must already have applied to the sentence by the time *man* comes into the picture. Schematically the situation looks like this:



The reason for assuming that the node *man* attaches to is CP comes from examples like that in (5.13), which are questions in which *man* precedes the WH-element.

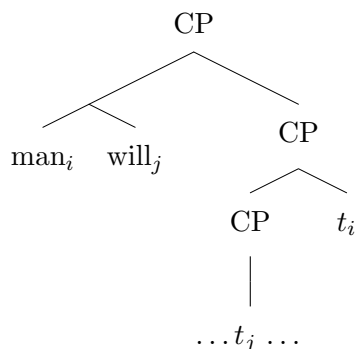
- (5.13)a. Man, what are you doing?  
 b. What are you doing, man?

These examples also show that sentence-initial *man* must attach at the CP level.

Thus, standard semantic composition will result in  $\llbracket man \rrbracket(\llbracket will(\varphi) \rrbracket)$ , where  $\varphi$  is the denotation of the sentence before composition with *will*. So it is clear that *man* cannot directly access the meaning of *will* and still retain compositionality in the semantics.

One could try to fix this problem up in various ways. One possibility is to assume some sort of movement for both *will* and *man*: *will* to a position where it composes directly with the rest of the sentence, and *man* to a position where it can directly compose with *will* before the other composition. In such a configuration, *man* could indeed modify *will* directly.

•



Although this kind of account is able to solve the compositionality problem, it assumes a good deal of unmotivated movement. And although *will* presumably needs to move for independent reasons (since otherwise it would be unable to compose with the sentence denotation for type reasons), the movement of *man* is much more mysterious, as is why it should move to the position it must for this account to work. And, further, we must assume that *man* type-shifts from an operator of type  $\langle t, t \rangle$  to one of type  $\langle \langle t, t \rangle, t \rangle$ , for otherwise it would not be of the right type to modify *will*; worse, this type-shifting happens *only* when *will* is present. It might even be that *man* only shifts in modal subordination contexts, though it is not easy to determine whether this is right, in that statements about the future already have something of a predictive flavor, and so it is hard to tell what is epistemic and what is not. In any case, this account does not seem to be ideal, especially since we already have another option available that is fully compositional but does not involve type-shifting or movement. So, ultimately, I am suggesting that we do in fact need to use the underspecification approach developed for *yo* in order to avoid compositionality problems.

It seems that the only instances in which modal subordination is made possible by *man* are cases where the conditions for the relation *Dep* discussed in the previous chapter obtain—that is, where an epistemic modal modifies a proposition which occasions a second—and, further, where *will* is present in the second constituent. To this end I define a modified version of *Dep*, *Dep<sub>E</sub>*, which is just like



*Dep* except that the second constituent must be modified by *will*. I will provide some discussion of the differences between *Dep* and *Dep<sub>E</sub>* at the end of the section.

- $\langle \alpha, \beta, \gamma \rangle \wedge \text{Epist\_mod}(\alpha) \wedge \text{occasion}(\alpha, \beta) \wedge \text{will}(\beta) > \text{Dep}_E(\alpha, \beta)$

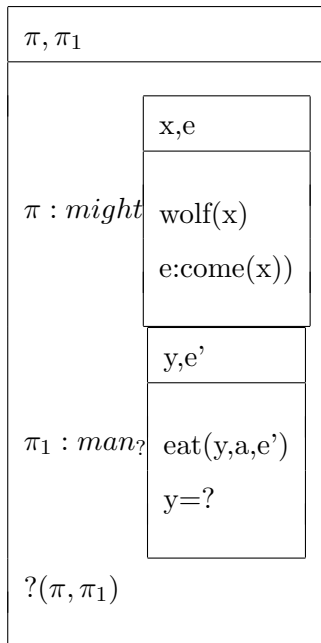
We can now define a rule for determining *man*-meanings in exactly the way we did for *yo* in the last chapter.

- Rules for *man* meanings:
- $\exists \pi' \exists R [\text{man}_?(\varphi, l) \wedge R(l, \pi) \wedge \text{Dep}(\pi', \pi) > \text{man}_\diamond(\varphi, l)$
- $\exists \pi' \exists R [\text{man}_?(\varphi, 1) \wedge R(l, \pi) \wedge \neg \text{Dep}(\pi', \pi) > \text{man}_{\text{sassert}}(\varphi, l)$
- Semantics for *man* (underspecified version):
- Semantics of *man*:

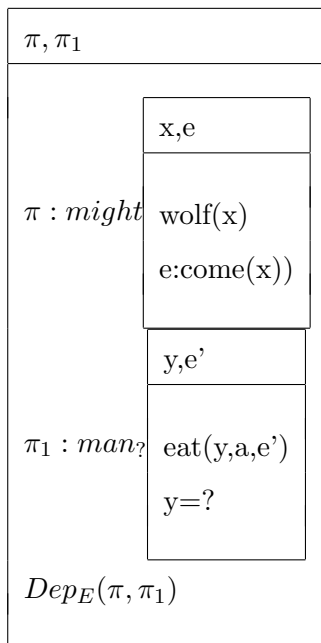
- $\sigma \|\text{man}_{\text{sassert}}(\varphi)\|\sigma'$  iff  $\sigma \|\text{sassert}(\varphi)\|\sigma'$
- $\sigma \|\text{man}_\diamond(\varphi)\|\sigma'$  iff  $\sigma \|\text{might}(\varphi)\|\sigma'$

One thing to note about this semantics is that there is in fact no coercion of *will* to a modal meaning. The need to do so is eliminated by the interpretation of *man* itself as modal in the *Dep<sub>E</sub>* case. A sentence including *will* and modified by *man<sub>◇</sub>* is interpreted as a futurate statement about epistemic possibilities: that, for  $\varphi$  in the scope of *will*, all epistemic possibilities output by the update with *man(will( $\varphi$ ))* contain some temporal branch on which  $\varphi$  is true. I think this is the right interpretation.

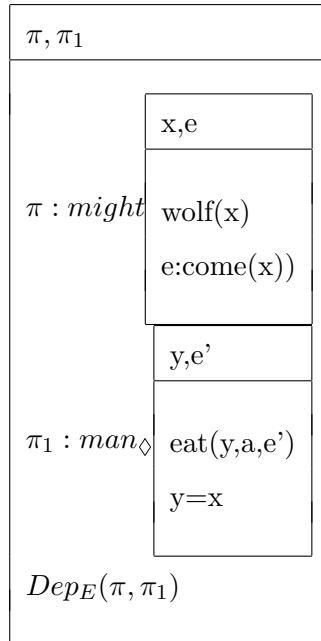
As should be clear, the modal subordination facts will work out just as they did in the *yo* case given this semantics. However, for maximum concreteness, let's consider in detail how they do in fact work out. The SDRS for (5.10a) is shown below. Here, just as in the modal-free Japanese case without *yo*, the variable *y* is unbound and cannot be bound given the semantics we have introduced.



The relation  $?$  holding between  $\pi$  and  $\pi'$  can be resolved to  $Dep$ , given how conditions on inferring that relation were defined. Performing this operation yields the following SDRS:



Now the conditions are fulfilled to identify the underspecified  $man?$  as  $man_{\diamond}$ , which in turn means that  $y$  can also be resolved to  $x$ , yielding a final SDRS for this example.



Clearly, then, the semantics given for  $man$  yields a possible binding for the pronoun, and for the occurrence of modal subordination, just as desired.

Here I would like to return to the discussion of a null modal-based analysis in the last section. The data with  $man$  presented here shows that such an analysis is ultimately not tenable, assuming, as I do based on their semantic similarity, that  $yo$  and sentence-final  $man$  should be given parallel analyses. Consider again an example of modal subordination licensed by sentence-final  $man$ .

(5.14) A wolf might come in. It'll eat you first, man.

Here, the syntactic position occupied by modal auxiliaries is already filled by the auxiliary *will*. Since the position is occupied,  $man$  will be unable to license a null modal and modal subordination should be bad, but this is not the case. I therefore conclude that the underspecification analysis I have presented here and in the

previous chapter is preferable to one based on null modals.

## 5.2 Sentence-initial *man*

This section considers particles of another kind, analogues of *man* that appear sentence- or clause-initially. Examples include sentence-initial *man* and its counterparts like *dude*, which seem to behave in a similar fashion.<sup>5</sup>

(5.15) Man, I know that.

(5.16) Dude, I know that.

We will see that these particles are rather complex: they have at least two distinct uses. The first use is one in which they stand alone and are in some sense anaphoric. In the second use, they are intonationally integrated into a sentence and serve to modify some element within it. We will also see that, although the basic semantics of the particles is independent of intonation, intonation does play a significant role in adding meaning to them. A basic aspect of the particle meaning, I will argue, is in ascribing some emotional content to the proposition they apply to: this is perhaps the intuition behind the common label of ‘intensifiers’ for these particles. Interestingly, the emotion ascribed is rather context-dependent; it can be either positive or negative, depending on its content, properties of the world, and the particular speaker. For instance, *man* in (5.17a) generally gets a positive interpretation, while in (5.17b) it is negative by default.

(5.17)a. Man, I won the lottery!

b. Man, I failed the test!

The section concludes with a semantics for these particles and a formal explanation of their polarity-switching behavior.

---

<sup>5</sup>We already saw that sentence-final *dude* was semantically similar to sentence-final *man*; the fact that sentence-initial uses of these particles are also similar suggest that they fall into a natural class of particles.

### 5.2.1 Sentence-initial *man*: distribution

I will begin by considering the syntactic distribution of *man*. First note that the name ‘sentence-initial’ is slightly misleading, for there are instances in which *man* need not appear at the beginning of a sentence. Specifically, it can appear after certain adverbials.

- (5.18)a. Actually, man, that’s not true.  
b. Evidently, man, Rachel has better things to do.  
c. Yesterday, man, I didn’t even go over there.  
d. In the house, man, that’s where I left it.

That is, *man* is an adjunct, and, as such, is ordered freely with respect to other adjuncts.

Interestingly, *man* can appear within a conditional consequent as well, either before or after *then*. It cannot appear within conditional antecedents, however.

- (5.19)a. \* If, man, you don’t get to work soon, then you’ll really be screwed.  
b. Man, if you don’t get to work soon, you’ll really be screwed.  
c. If you don’t get to work soon, then, man, you’ll really be screwed.  
d. If you don’t get to work soon, man, (then) you’ll really be screwed.

I do not know why this should be; one possibility is that *man* is dependent in some way on speech acts, and, although conditional consequents are associated with speech acts (‘conditional speech acts’), conditional antecedents are not. I will not discuss this point further in this work.

I will now move on to some semantic characteristics of *man*’s distribution. Sentence-initial *man* behaves rather differently from its sentence-final counterpart. First, note that it clearly does not license modal subordination:

(5.20) A wolf might walk in. # Man, it eats/ate/will eat you first.

(5.21) A thief might break in. # Man, he takes/will take the silver.

This fact already suggests that it has a different semantics from sentence-final *man*.

But even without the modal subordination facts, it is clear that there are differences between sentence-initial and sentence-final *man*. Consider the minimal pair in (5.22):

(5.22)a. John didn't come to the party, man.

b. Man, John didn't come to the party.

(5.22a) has the effects of insistence described in the previous section. But (5.22b) does not seem to anticipate any resistance on the part of the hearer; rather, *man* here expresses the attitude of the speaker toward the fact that John didn't come to the party. This attitude could be either positive or negative, depending on the context. I will expand on this issue further in section 4.4.

Sentence-initial *man* expresses that the speaker has strong feelings about the proposition that hosts it; and, possibly, that the feeling in question is negative. But the feelings expressed can be unambiguously positive, given a different sort of content. This is so when *man* is hosted by a sentence that expresses content that is positive in nature.

(5.23)a. Man, I got an A on my calculus test!!

b. Dude, she's going to go to a movie with me this weekend!

*Man* and *dude* in these examples clearly serve to express a positive emotion. But when the content is clearly negative, *man* seems to express a negative emotion.

(5.24)a. Man, I wrecked my car this morning.

b. Dude, someone stole my credit cards.

We will see in the next section that the same kind of pattern is found in expletives, which, although usually taken to express rather negative feelings, can also be positive when applied to the right proposition. These facts will follow from the formal analysis I give later in the chapter.

But the situation not quite this simple. There are further complexities with the distribution of *man*: it is not always integrated into the sentence proper, but sometimes stands apart intonationally. In examples like (5.25a), *man* can be integrated into the intonational phrase of the CP it precedes; there is no ‘comma intonation’ used (or at least need not be), so no pause must appear between *dude* and *this*. I will call this intonational pattern of particles *integrated intonation*. The sentence is also fine if comma intonation is used. However, in (5.25b), the sentence is distinctly odd without comma intonation; if one pronounces the sentence without a gap between *man* and *John*, it is infelicitous. So, in certain sentences, comma intonation is obligatory. I will give a semantic characterization of this distinction in the sequel.

- (5.25)a. Dude, this water is too hot! (comma or integrated)  
 b. Man, John came to the party last night. (comma only)

There are also other intonational differences that interact with these possibilities. *Dude* or *man* in isolation can have several distinct tones: these include, roughly characterized, a low tone that rises and a low tone that rises and then falls again.<sup>6</sup> I am a little uncertain about the exact representations that should be given to the tones; to make this point completely clear, some experimental work must be done in a more systematic way than I have been able to do at this point. I will tentatively characterize the two contours as *rise* (R) and *rise-fall* (RF). The first of these seems to express a kind of exasperation, an emotion *simpliciter*; the second clearly expresses surprise (cf. Ward and Hirschberg 1988), in addition to an emotion,

<sup>6</sup>I make this statement based on examination of pitch tracks within Macquiner.

here more likely a positive one. The two intonational patterns can appear freely with independent and integrated intonation.

(5.26)a. Dude, this water is too hot! (integrated intonation)

R ... OR

RF

b. Dude, she's going to go to a movie with me this weekend! (independent)

R ... OR

RF

Two caveats need to be made at this point. First, I am not sure that these two contours exhaust the possible tonal patterns of the particles; it may well be that there are additional patterns that are associated with other meanings. Second, as may be already clear to the reader, the overall intonation of the sentence also plays a large role in determining how things are interpreted, as already discussed by a number of authors (see e.g. Ward and Hirschberg (1988) or Pierrehumbert and Hirschberg (1990) for more on this issue). I will not be able to consider how particle pitch contour and the larger intonational contour of the sentence interact in this dissertation. Here I will focus on the particles; but what I have to say should be taken as preliminary to this larger project.

Let's now return to the contrast between integrated and independent intonation discussed above. What might be the explanation for the restrictions on the use of integrated intonation? The answer seems to be that sentence-initial *man*, in order to be integrated into the intonational phrase of a sentence, requires that the sentence express an attitude of the speaker. Consider the example immediately above. Here the speaker expresses a judgement about the heat of the water: that it is excessive.

To clarify this issue, let's consider some more examples of judgement sentences, all of which can be used with either integrated or comma intonation.



- (5.27)a. Man, it's hot!
- b. Man, that problem was hard!!

Here, again, information about the speaker is being expressed in some sense. Predicates like *hot* and *hard* are speaker-dependent; there is no speaker-independent criterion for determining whether some problem is hard, or whether a particular temperature qualifies as hot.<sup>7</sup> Because of this, sentences like those in (5.27) provide facts both about the speaker's judgement about some external object (e.g. *that problem*) and his criteria for judging something hot or difficult. In the next section we will see that integrated expletives are also limited to sentences of this sort.

Here I would like to point out that not all particles are equal in terms of their ability to appear with integrated or independent intonation. As we have seen, *man* can be used with both. The particles *dude* and *boy*, however, are not as free: *dude* can be used only with independent intonation, while *boy* can only appear with integrated intonation.<sup>8</sup>

- (5.28)a. Man, this water is hot. (independent or integrated)
- b. Dude, this water is hot. (independent only)
- c. Boy, this water is hot. (integrated only)

I do not know what causes these restrictions, but it is clear that the same interpretations arise when a particular reading is possible. Since my focus is on explicating the semantic effects of the particles, I will not speculate on why these restrictions might exist, and in the rest of the discussion will use *man* in all examples in order to bring out both readings in a straightforward way.

<sup>7</sup>See Lasersohn (2004) for detailed discussion of these issues.

<sup>8</sup>It may be that *boy* can be used with independent intonation in some dialects, e.g. those of the American South and the UK. It does not work in 'standard' American English, however.

We should finally consider one additional use of *man* that might be described as sentence-initial, in case the following sentence is comprised of the empty string.

(5.29) Man!

Here, *man* simply expresses surprise at the unlikelihood of something, when it has the tone contour R, and exasperation, when it has the contour RF. I will argue below that this use of *man* is either anaphoric or, in some sense, demonstrative. The first, anaphoric, use will be assimilated to sentence-initial *man* with comma intonation.

To summarize, sentence-initial *man* has several distinct patterns of distribution. I also note the initial generalizations about their meanings. These observations will be expanded on and modified in what follows.

- Free-standing *man*: preceding a sentence, or by itself. Expresses surprise.
- Integrated *man* with judgement sentences: expresses that some property is held to an extreme degree and that this is surprising.

### 5.2.2 Meaning of sentence-initial *man*

We have three cases to consider. Let's go through them in turn.

#### **Free-standing *man***

What does it mean when one says (5.30)? The punctuation I use here ('!') suggests an exclamation. I think this is natural. But I don't think that there is a substantial semantic difference in *man* when it's used exclamatively and *man* when it has a flavor of complaint. There are different effects, but they don't seem to have much to do with *man* itself, but rather with the intonation; as I suggested above, it seems to me that RF has a negative flavor, and R an exclamative one, which is (often) more

positive.<sup>9</sup>

(5.30)Man! (= *man* with R accent)

In my judgement, (5.30) has a complex meaning with several distinct components. First, it is an expression of surprise with respect to some fact; this component comes from the intonation, on my intuition. The utterer of (5.30) has been confronted with something unexpected. What is this ‘something’? A fact present either in the immediate linguistic (5.31) or extralinguistic (5.32) context.

(5.31)I’ve gone to a party in the country with two friends, one of whom, Jimmy, was driving. Late in the evening my other friend, Joey, comes up to me and says ‘Jimmy already took off!’ We have no ride home. I say: (5.30).

(5.32)I’ve gone to a party in the country with two friends, one of whom, Jimmy, was driving. Late in the evening, I realize that I haven’t seen Jimmy for awhile and go out to see if he is outside. I notice that his car is gone—we have no way home. I say: (5.30).

These two possibilities suggest two things. First, any given utterance of free-standing *man* relates to some proposition in the context: that is, free-standing *man* functions as a propositional operator serving to express surprise. But note that something other than surprise is expressed in these situations, namely some negative emotion (distress?) resulting from the fact in question. This is the second part of the complex meaning of *man*, which I will discuss in more detail below. Second, the proposition that *man* applies to can be picked up either deictically, as in (5.32), where I utter

---

<sup>9</sup>There is a question about why *man* isn’t associated easily with intonational patterns characteristic of questions (*man?*). I will leave this problem for another occasion, here limiting myself to the suggestion that the reason is that *man* lacks truth-conditional content and so is not an appropriate object for questioning. See Groenendijk and Stokhof (1997) for more on why such an analysis might make sense. There is also the possibility that *man* is simply too short to host the intonational contour associated with questions.

(5.30) with respect to some external fact, or anaphorically, as in (5.31), where I utter (5.30) with respect to the linguistic context—the statement made by Joey. The possibly anaphoric character of *man* will be important when we consider the other sort of free-standing *man*, that isolated from its host sentence by comma intonation.

Before going on to this second sort of free-standing *man*, though, let me briefly address a possible criticism of my characterization of *man* as expressing surprise. I could utter *man* in contexts like that in (5.33), which suggests at first glance that my characterization cannot be right, because since I already knew perfectly well that it was hot, uttering (*mann*) about the heat should be infelicitous:

(5.33) I am employed as a ditchdigger. It's August in Texas. I knew it was hot when I started work this morning, but as we get on toward noon I realize just how hot it really is and how unpleasant it is to be digging ditches on such a miserable day. I say: (5.30).

Actually, this is not such a problem. Here I did indeed know that it was hot; but I somehow didn't realize the extent of that heat. So I have in fact got some new information with respect to which I can be surprised.

Free-standing *man* can, of course, also appear with RF accent, even in the contexts above. With this intonation, it simply expresses a negative emotion; the element of surprise is absent. Below I will therefore give the semantics of *man* independently of the contribution of intonation (except for the integrated-independent contrast, which has an impact on semantic types).

### **Free-standing *man* with host sentence**

Let's now consider the second sort of free-standing *man*, that which appears preceding a host sentence but separated from it by comma intonation, as in (5.34).

(5.34) Man, George Bush came back to Texas yesterday.

Here, *man* expresses an emotion (probably something negative) with respect to the fact described by the host sentence. It also seems to indicate that the fact of George Bush's return is unexpected for some reason. It's difficult to interpret the expressed emotion and surprise as expressed about any other proposition. To make this even clearer, consider the following example, in which (5.34) is embedded in a larger discourse. Assume that A, B, and C are all rabid haters of the current administration, and further that the location of the conversation is Washington. Finally, assume that *man* is uttered with with the RF intonation contour indicating disappointment.

- (5.35)a. A: Dick Cheney is on vacation in Venezuela.  
b. B: No, I saw him at Starbuck's this morning.  
c. C: Man, George Bush went back to Texas yesterday.

Presumably, given the context, the content of B's utterance is a better candidate for C's disappointment than the information that George Bush has left the District of Columbia. Still, it is not easy to interpret *man* in this way, in my judgement, suggesting that *man* truly must apply to the proposition expressed by the sentence hosting it, if there is such a sentence.

### **Integrated *man***

Let's first look at some more examples.

(5.36)OK with both intonational patterns:

- a. Man, it's hot.  
b. Man, that's a cool shirt.  
c. Dude, the TA stipend at this university sucks.

(5.37)Bad with integrated intonation:

- a. Man, over 70,000 people were killed by the tsunami in Asia.
- b. Man, George Bush was reelected.
- c. Dude, the TA stipend at this university is \$9,000 a year.

The sentences in (5.36) all express the speaker's judgement about something: the hotness of the day, the coolness of someone's shirt, the poverty of financial support at some university. The sentences in (5.37) all describe facts. Based on examples like these, we can conclude that integrated intonation is possible only with examples that express the speaker's judgement or opinion about something.

The sentences in (5.46) also have another common property. The predicates in these sentences all are gradable in nature: they describe states of affairs which can be compared or make reference to degrees. For instance, one thing can be hotter than another, and some fact can suck more than another fact. It seems that sentence-initial *man* can be intonationally integrated only in sentences that involve a gradable predicate; sentences like these express, in a sense, the speaker's judgement (or opinion), in that gradable predicates are also vague. What is hot for one person may not be hot for another, or in another context; similarly for coolness or for whether something sucks or not.

Note though that sentences like the following can also be used with integrated intonation:

(5.38) Man, we drank beer last night.

This sentence is not gradable in any obvious way: but, in fact, when *man* appears here with integrated intonation, the predicate is interpreted as gradable in some sense. The meaning we get here is something like: 'we drank beer to some extreme last night', or, 'we really drank a lot of beer last night'. Thus, the apparently event-describing factual sentence is coerced into a statement about how extreme the event is, compared to other, similar events. We will see shortly that similar facts hold for

expletives; in order for them to be integrated, a gradable (or potentially gradable) predicate is required, but coercion is also possible.

Let's now consider an example that looks, at first glance, problematic for my thesis about distribution, one in which the sentence seems to describe a fact but in which integrated intonation is still possible. This example will help clarify what *man* is doing in sentences with integrated intonation.

(5.39) Man, those are red sneakers.

Since the sneakers in question are probably either red or not red (though the literature on vagueness calls this claim into question; see e.g. Fine 1975; Barker 2002, among many others), and thus the sentence in some sense describes a fact, this example looks like a counterexample to my claim. However, this is not so. The sentence actually makes a claim about the speaker's feeling about how red the sneakers are, with respect to some comparison class. Here *damn* seems to associate with *red* in the sense of Rooth (1985); it introduces an interpretation on which the speaker states a belief that the sneakers are red to some extreme degree. This interpretation is not present in a similar sentence without the particle:

(5.40) Those are red sneakers.

Note also that, in fact, *man* with integrated intonation can sometimes be used with sentences that clearly *do* describe facts, such as in the example in (5.41).

(5.41) Man, George Bush won the election. (comma/integrated)

But it is crucial to note that the interpretation of this example is quite different depending on whether *man* is pronounced with comma or integrated intonation. When comma intonation is used, the sentence is interpreted just as in the examples of comma intonation discussed above: some emotion is expressed toward George Bush's winning, and some surprise as well. When integrated intonation is used, however,

the sentence expresses something about the *degree* of his winning—for instance, that the amount of the popular vote he won defied all expectations. What examples like these show, then, is that integrated intonation is possible more generally than I implied earlier, but only if the sentence is coerced to an interpretation that involves degrees.

So we have learned that some sentences with integrated intonation serve to express the speaker's feeling about the degree to which some property is possessed by an object (which may be physical or temporal; cf. *Man, it's hot.*, in which the object that *hot* is predicated of is a stretch of time). Note, however, that the presence of a gradable predicate is not enough to license integrated intonation if no potentially comparative element exists in the sentence: in the following example, use of the superlative selects a reading of the adjective that is 'closed' in the sense of not being shiftable to a more extreme reading, and only comma intonation is possible.

(5.42) *Man, that's the bluest shirt I've ever seen.* (comma only)

## Summary

Let me here briefly summarize what I have said about sentence-final *man*.

- Free-standing *man*: expresses surprise and some emotion (positive or negative) about some proposition which is picked up anaphorically or deictically.
- Free-standing *man* with host sentence: as above, but must apply to the proposition expressed by the host sentence.
- Integrated *man* with fact sentence: expresses surprise and some emotion about the truth of the fact the sentence expresses.
- *Man* is sensitive to intonation: when it has the RF contour, it expresses a negative emotion, and when it has R it expresses surprise.



A formal account of these facts will be given in section 5.4.

### 5.3 Expletives

This section considers expletives like *damn* or *fuck* in examples like those in (5.43). Just as with sentence-initial *man*, I will divide the expletive examples into two types: stand-alone expletives and integrated expletives. We will see that similar distinctions can be drawn to those shown for *man*.

- (5.43)a. Damn/Fuck!  
b. {Damn/Fuck}, this is good!

Expletives, however, differ from pure particles like *man* in that they also have an adjectival use, shown in (5.44).

- (5.44)a. Give me the fucking shovel.  
b. He's a crazy fucking guy.

Here again we have two distinct types: those like (5.44a), in which the expletive is the sole adjectival modifier, and those like (5.44b), in which it appears with additional modifiers. The two types have a somewhat different meaning: both function as intensifiers, but the non-adjectival expletives like those in (5.43) also have additional functions. One reason for this most likely is that the expletives in (5.43) can host intonational meanings, but adjectival expletives like those in (5.44) cannot. In any case, I will not discuss adjectival expletives in this dissertation in much detail. See Potts (2005) for some discussion and for a formal account of their meaning.

The next subsection will discuss the meaning of these subtypes in some detail, after which I will move on to provide a formal account in section 5.4.

### 5.3.1 The meaning of expletives

I begin with the integrated expletive case, as it is most similar to the particle cases in the previous section. I then move on to consider stand-alone and adjectival uses of expletives.

#### Expletives with host sentences

Let me begin by considering the following two sentences.

- (5.45)a. Damn, this is good. (comma or integrated intonation)  
b. Damn, John came to the party. (# with integrated intonation)

It seems to me that in (5.45a), just as in the cases of sentence-initial *man* with judgement sentences, *damn* can be integrated into the intonational phrase of the CP it precedes; ‘comma intonation’ need not be used, so no pause must appear between *damn* and *this*. The sentence is also fine if comma intonation is used. However, in (5.45b), the sentence is distinctly odd without comma intonation; if one pronounces the sentence without a gap between *damn* and *John*, it is infelicitous. What might be the cause of this phenomenon? The answer, I will suggest, is that the cause is just the same as we saw above for the *man*-type particles: a need for gradability or judgement on the part of the speaker.

To see this, let’s consider a version of the examples in (5.36) and (5.37) above, but now with expletives instead of *man/dude*.

(5.46)OK with both intonational patterns:

- a. Fuck, it’s hot.  
b. Damn, that’s a cool shirt.  
c. Damn, the TA stipend at this university sucks.

(5.47)Bad with integrated intonation:

- a. Damn, over 70,000 people were killed by the tsunami in Asia.
- b. Fuck, George Bush was reelected.
- c. Damn, the TA stipend at this university is \$9,000 a year.

The sentences in (5.46) all express the speaker's judgement about something: the hotness of the day, the coolness of someone's shirt, the poverty of financial support at some university. The sentences in (5.47) all describe facts. Based on examples like these, we can conclude that integrated intonation is possible only with examples that express the speaker's judgement or opinion about something, just as with sentence-initial *man*.

The same facts also apply to expletives that did to sentence-initial *man* about sentences like that in (5.48). Just as with the *man* example we looked at in the last section, (5.48) makes a claim about the speaker's feeling about how red the sneakers are, with respect to some comparison class. In particular, the sentence asserts that the sneakers are red, in fact extremely red; and expresses in addition that the speaker finds this redness somehow unusual or surprising.

(5.48) Damn, those are red sneakers.

This interpretation is not present in a similar sentence without the particle:

(5.49) Those are red sneakers.

When we consider the other examples discussed previously in which integrated intonation was possible, it is clear that the same pattern appears in them as well; the particle associates with whatever expression in the sentence serves to express the speaker's judgement. Thus, in (5.46) the speaker is making a statement about the relative degree of hotness of the day, or coolness of the shirt, or inadequacy of the TA stipend.

To summarize briefly, the semantics of expletives are similar to that of sentence-initial *man* and its kin in that the sentence hosting the expletive must describe the speaker's judgement about something in order for integrated intonation to be used. The semantics of these items therefore must be complex; they express the speaker's judgement about the degree of some property when integrated, and a more general emotion when 'standing alone' with comma intonation. What emotion exactly is expressed? This issue is the topic of the next section.

### **Stand-alone expletives**

I will now consider examples like (5.50).

(5.50)Damn/Fuck!

There are at least two distinct meanings associated with these kind of utterances. The first is more or less like the stand-alone *man* examples above; the utterance expresses some emotion (here, generally negative, but positive in the right context) about some proposition which is either picked up anaphorically from previous linguistic content, or picked out deictically from the general context. Instances of each are shown in (5.51) and (5.52) respectively; these are the same situations that were used above for stand-alone *man*, so it is clear that they have the same distribution.

(5.51)I've gone to a party in the country with two friends, one of whom, Jimmy, was driving. Late in the evening my other friend, Joey, comes up to me and says 'Jimmy already took off!' We have no ride home. I say: (5.50).

(5.52)I've gone to a party in the country with two friends, one of whom, Jimmy, was driving. Late in the evening, I realize that I haven't seen Jimmy for awhile and go out to see if he is outside. I notice that his car is gone—we have no way home. I say: (5.50).

I showed in the last section that integrated and stand-alone intonation work the same with expletives as with *man*, we should consider whether intonational contours also play the same role. The answer is yes. Consider the examples in (5.53).

(5.53)a. Fuck ...

RF

b. Fuck!

R

(5.53a) expresses a negative emotion; (5.53b) expresses surprise, or serves as an exclamation; this intonational contour is also associated with exclamatives, it seems to me.<sup>10</sup>

Are there any differences between the expletives and stand-alone *man*? Common sense says yes, and in this case I think it is right. One might guess that expletives express negative emotions; but this does not seem correct, given examples like that in (5.54).

(5.54)a. Damn! That's great!

b. Damn, this cake is tasty.

Compare these examples to similar examples with *man*.

(5.55)a. Man! That's great!

b. Man, this cake is tasty.

It seems to me that the distinction between (5.54) and (5.55) lies in the *degree* of emotion expressed; the examples in (5.54) ascribe a more positive feeling to the sentence than those in (5.55) do, something like 'very positive' or 'very negative'. I will formalize this account below.

---

<sup>10</sup>See Zanuttini and Portner (2003) for discussion, although they do not explicitly address the role of intonation.

## Adjectival expletives

Now I want to briefly consider adjectival uses of expletives. Here the expletive appears in the form of an adjectival verb, as in examples like (5.56). Some of the expletives can also appear in a bare (infinitive) form just as in the stand-alone cases, as with *damn* in (5.56b).

(5.56)a. Give me that fucking pencil.

b. I hate that damn(ed) cat.

Again, with adjectival uses of expletives there is no sense of surprise; the expletive simply serves to express an emotion. Unlike the other examples we have considered, however, this emotion is expressed about an individual: the pencil in (5.56a) and the cat in (5.56b). These cases have been discussed in some detail by Potts (2005), who notes that adjectival epithets need not always express something about individuals. Potts notes that his interpretation of this example may be controversial; there does seem to be a reading on which the speaker expresses disapprobation of the machine itself.

(5.57) Nowhere did the instructions say that the damn machine didn't come with an electric plug! (Potts, 2005)  
= The instructions didn't say that the machine doesn't come with a plug AND  
The fact that the machine has no plug is bad.

Potts' semantic system (the *logic of expressive content*) handles these examples using syntactic distinctions in the logic: a distinct type for expressive content coupled with type-shifting rules.<sup>11</sup> I will not worry about these issues here. I only want to discuss the fact that, like *man* and the nonadjectival expletives, adjectival expletives have the property of being able to 'switch polarity' in the right contexts. Consider the examples in (5.58).

---

<sup>11</sup>Making the type-shifting optional allows for the machine-oriented reading of (5.57); but this is not the place to go into the technical details.

- (5.58)a. Your cousin is a fucking idiot.
- b. Your cousin is a fucking genius.

Clearly, *fucking* in (5.58a) is interpreted as negative, and, just as clearly, in (5.58b) is interpreted as positive. As noted by Potts (2005), the interpretation of these expressions is contextually dependent. In the next section, I will give an analysis of how this contextual dependence works; there I will also show that it applies just as well to the adjectival expletives as to their particulate cousins.

## 5.4 Analyzing the sentence-initial particles

In this section I provide an analysis of the expressive particles: sentence-initial *man* and its kin, and the epithets. I first lay out the framework I will use in my analysis, which involves some elements from McCready (2004) along with a function to emotional predicates. The account I will present distinguishes two distinct types for the particles: one for stand-alone uses, and one for integrated uses. Making this move allows explanation of several independent facts about usage of the particles, as I will show.

### 5.4.1 Tools: emotive meaning

We have seen that the interpretation of the emotional component of the epithets and sentence-final *man* depends on the context. More specifically, it depends on what the context tells us about the perceived ‘goodness’ or ‘badness’ of some proposition; thus, say, propositions describing having a rotten egg broken over one’s head might be understood as **bad**, and propositions describing winning a million dollars in the lottery are probably understood as **good**. However, these interpretations are quite context-dependent; suppose, for instance, that one also knows that winning a million dollars in the lottery will result in having to pay out two million in taxes. In such

a world, winning a million dollars might be perceived as being pretty **bad**.

What this discussion tells us is that the numerical indices that are assigned must be made context-dependent. How can this context-dependency be accounted for formally? I will make use of a complex function from contexts and propositions to emotional values.

I follow Kaplan (1989)<sup>12</sup> in taking contexts to be tuples containing information about the surroundings in which the proposition is uttered.

(5.59) A context is a tuple  $c = \langle c_A, c_T, c_W, c_P \rangle$ , where

- $c_A$  is the agent of  $c$ ,
- $c_T$  is the time of  $c$ ,
- $c_W$  is the world of  $c$ ,
- and  $c_P$  is the place of  $c$ .

I will analyze the meaning of the particles as context-dependent, as suggested by the discussion in the previous section; specifically, I will make use of a function from contexts to emotions, which I will call  $E$ . The only elements of the tuple that play a real role here are  $c_A$ , the agent of the context, and  $c_W$ , the world parameter; the others are there for indexical interpretation and are included here only for consistency with the rest of the literature on context.

The function we need, then, looks like this: a function from contexts, to propositions, to emotion predicates.

- $E : c \mapsto \wp(W) \mapsto A$ , where  $A \in \{\mathbf{bad}, \mathbf{good}\}$ .

Or, stated using the  $\lambda$ -calculus,

- $E = \lambda c. [\lambda p. [A]]$

We can then apply the resulting predicate to a proposition as usual (i.e.  $A$  is of

---

<sup>12</sup>Among many others; see also Schlenker 2003; Anand and Nevins 2004, etc.



type  $\langle t, t \rangle$ ). The formula  $A(\varphi)$  should be read ‘the agent of the utterance context holds the attitude  $A$  to  $\varphi$  in  $w$ ,’ or, slightly more formally,

- $\llbracket A(\varphi) \rrbracket = A(1(c), \varphi, 4(c))$

The question now is which element of  $\{\mathbf{bad}, \mathbf{good}\}$  is selected for  $A$  in any given instance. This is determined by the context: facts about the world  $w_C$  and the agent  $a_C$  decide whether the proposition is evaluated as bad or good. I will not attempt to indicate exactly what these facts should be; clearly, the issue is complicated, and probably relates more to world knowledge and psychological factors than to linguistic knowledge as such. My concern here is to set up a system in which this evaluation is possible, once the relevant metrics are known.

Another possibility would be to make use of an idea in Potts and Kawahara (2004): to assign expressive meanings ‘emotional’ content using the set of real numbers in the interval  $[-1, 1]$ .<sup>13</sup> -1 signifies a very negative attitude, while 1 signifies a very positive one. Potts & Kawahara use these indices for marking the emotional content of Japanese honorifics.

Using this kind of account, propositions could be assigned indices in this interval. This index would be assigned based on what the context tells us about the perceived ‘goodness’ or ‘badness’ of some proposition. So propositions are assigned indices by a function from contexts to the interval  $[-1, 1]$ :

$$(5.60) E' = f : C \mapsto \wp(W) \mapsto [-1, 1], \text{ where } C \text{ is the set of contexts.}$$

I will not take this approach, sticking with the simpler account above which does not involve numerical indices, for the following reasons. First, it is not totally clear to me how one should go about assigning precise numbers to the emotions that are associated with particular events and propositions. It’s difficult to avoid the suspicion that any such assignment must be to some degree *ad hoc*. Potts and

---

<sup>13</sup>This idea apparently originated with William Ladusaw.

Kawahara avoid this problem to an extent by assuming that honorifics essentially presuppose that their denotations fall within a particular *range* of the interval rather than having a specific index.<sup>1415</sup> But for our purposes this won't do, since the analysis of epithets and *man* will not involve presuppositions in this sense. The other reason for not selecting the real number approach is that it complicates the models—which are quite complicated enough already. For these reasons, I will simply use the expressions **bad** and **good**. Those readers that are disturbed by this decision are welcome to consider these expressions as shorthand for more complex indices or intervals of the reals; the content of the discussion will not change much, for the contextual parameters will be set in a similar way.

#### 5.4.2 Meaning of epithets and *man*: emotion

With the above function  $E$ , we are ready to define the semantic interpretation of sentence-initial *man* and the epithets. I will begin with the emotional content of these expressions and then move on to the comparative element. Since the semantics of integrated particles is more complicated than that of the stand-alone particles, I will reserve discussion of it for a bit and start by concentrating on the stand-alone particles exclusively.

Both *man* and the epithets express the speaker's emotion about their propositional content. Because of this, we can treat them as expressions of type  $\langle t, t \rangle$ ; their effect is to introduce emotional content. This effect can be modelled simply by using the function  $E$ . But since, as we saw above, the epithets introduce a stronger emotion than does *man*, I introduce the modifier *very* into the semantics of the epithet. With this, the strength of the emotion from the epithet comes out in a simple

---

<sup>14</sup>This requirement of honorifics is modelled as a definedness condition on dynamic update; while they don't explicitly use the term 'presupposition,' they point out that the analysis has some common characteristics with analyses of definite descriptions, which are clearly presuppositional.

<sup>15</sup>They must still associate individuals with specific indices, however, which I find slightly dangerous epistemologically; I certainly don't feel that I understand my feelings with respect to other people well enough to place them on a scale of 1 to 10, let alone an infinite one.

manner.

- $\llbracket man \rrbracket = \lambda p.[p \wedge E(c)(p)(p)]$
- $\llbracket fuck \rrbracket = \lambda p.[p \wedge very(E(c)(p)(p))]$

These lexical entries are designed so that  $P(\varphi)$ ,  $P$  an emotive particle, entails  $\varphi$ , which is certainly the case as shown by the following pairs:

(5.61)a. Man, I'm tired of this already.

b. I'm tired of this already.

(5.62)a. Fuck, it's hot.

b. It's hot.

I forced this entailment to go through in a very simple manner: I introduced  $\varphi$  and  $A(\varphi)$  separately into the lexical entry. This may be thought somewhat inelegant. Still, it would be an error to ask that the entailment follow from the semantics. Emotion predicates are not veridical; they do not entail the truth of their complements, at least not in all syntactic frames. The situation is complex in that emotion predicates can take a number of different complement types: *that*-clauses, *if*-clauses, infinitives, and gerunds.

(5.63)a. It is bad that Brian likes Kylie Minogue.

b. It is bad if Brian likes Kylie Minogue.

c. It is bad to like Kylie Minogue.

d. Liking Kylie Minogue is bad.

My intuition is that (5.63a) implies that Brian does in fact like Kylie Minogue, but (5.63b) does not entail anything about Brian's musical taste, and (5.63c,d) do not have any existential entailments about Kylie fans. I conclude that emotion

predicates are neither veridical or antiveridical<sup>16</sup> but are simply nonveridical; they do not entail either the truth of their complements or their falsity. Thus, it seems to me a mistake to put the entailment directly into the model theory; this is why I opt for a more syntactic approach.

Let's look at how this semantics handles the meaning of an example with *man* (sentences with epithets function similarly except that their meaning is stronger).

(5.64) Man, George Bush won the election!

A simplified form of the proposition denoted by the host sentence is  $won(gb, e)$ .<sup>17</sup> After  $\beta$ -conversion using the utterance context and the host proposition, we end up with the following:

- $man(won(gb, e))$

The denotation of this formula is

$$won(gb, e) \wedge E(c)(won(gb, e))(won(gb, e)).$$

So the content of the host proposition is preserved by application of *man*, as desired. Now: What is the content of  $E(c)(won(gb, e))$ ? The answer to this question will depend on the nature of the context which was given to  $\llbracket man \rrbracket$ . In particular, it will depend on the speaker and world parameters. I will concentrate here on the speaker parameter. Imagine first that (5.64) is uttered by a staunch Republican. Then the proposition expressed by the host sentence is one that the speaker finds positive, meaning that  $A$  in the formula  $A(c)(won(gb, e))$  is resolved to **good**; (5.64) thus denotes  $won(gb, e) \wedge \mathbf{good}(won(gb, e))$  for such a speaker. In contrast, if (5.64) is uttered by, say, John Kerry, the beliefs of the agent of the context

<sup>16</sup>A predicate  $P$  is antiveridical iff  $P(\varphi)$  entails  $\neg\varphi$ .

<sup>17</sup>A more complete version would include information about tense and aspect, as well as the presupposition of the definite. These things are not important for this illustration, however.

about the proposition in question are not so positive, and  $A$  maps to **bad**, yielding  $won(gb, e) \wedge \mathbf{bad}(won(gb, e))$  as the denotation of (5.64).

A similar process accounts for the difference in the meaning of the two sentences in (5.65), in which the content of the attitude is quite different.

(5.65)a. Man, this beer is warm.

b. Man, this beer is cold.

Assume that these two sentences are uttered by someone who is not British. Then, under ordinary circumstances, (5.65a) will be perceived as negative and (5.65b) as positive. As a result,  $A$  will map to **bad** in (5.65a) and to **good** in (5.65b). The difference between this case and that of (5.64) is that the change in the attitude is not due to a difference in the context —the agent parameter in (5.64)—but to differences in the perceived desirability of the fact described by the proposition itself. I see the ability to model distinctions in interpretation along these two dimensions as one advantage of the present theory.

Before moving on to consider the interaction of the particles and intonation, I want to briefly note that the system presented here can account for the polarity switching behavior of the adjectival epithets as well. Recall that e.g. *fucking* could be interpreted either as positively or negatively, depending on the context, as we saw in examples like (5.66).

(5.66)a. Your cousin is a fucking idiot.

b. Your cousin is a fucking genius.

Within the present system, the assumption that the epithet contributes the predicate  $E$  to the semantic representation of the sentence is sufficient to understand why this polarity switching takes place. The argument goes just as in the case of (5.65) above; the content of the sentence biases  $E$  toward either a **good** or **bad** interpretation.

I will not work this idea out further here, but this avenue seems to be a promising one for future research.

### 5.4.3 Meaning of epithets and *man*: intonation

Both the epithets and the *man*-type particles convey a sense of surprise when used with R intonation, as discussed above. This is relatively simple to formalize: we need only introduce a scale on the relative likelihood of the occurrence of particular propositions that is associated with the intonational contour. We will see later, however, that there are additional complications in the case of integrated particles; but even these are fairly straightforward.

I use the following scale, which is based on discussion of *even* in Guerzoni 2003. In words,  $\varphi$  is more likely than  $\psi$  in a context  $c$  iff, given a contextually relevant set of facts, the likelihood of  $\varphi$  is greater than that of  $\psi$ .

- $\varphi >_{L_c} \psi$  iff  $\Gamma \models \text{Likelihood}(\varphi) > \text{Likelihood}(\psi)$ , where  $\Gamma$  is a set of contextually relevant facts in  $c$ .

Note that relativizing the scale to contexts, rather than simple worlds as Guerzoni does, is useful here in that it allows computation of the scale to take into account the possibly different opinions of particular speakers about what is or is not likely.

I will assume that intonational contours are associated with meanings, following Ward and Hirschberg (1988) and Bartels (1997) (though I do not make use of the details of these accounts). In particular, R intonation has a meaning associated with surprise; it makes a statement about the likelihood of a particular proposition. I give it the following lexical entry. Note that I do not want to claim that the R contour is *always* associated with this meaning; just that it has this meaning in the particular context of particles.<sup>18</sup> Here  $C$  is a comparison set with respect to which

---

<sup>18</sup>It is not clear to me how well this analysis generalizes to other uses of R, but I suspect that the answer is: not well. In particular, I don't think that the 'surprise' meaning is the right one when R spreads over an entire sentence. See Bartels (1997) for discussion.

the likelihood of  $p$  is evaluated; I assume that its value comes from context (cf. von Stechow 1994; Marti 2003). Also, a word about the quantifier *MOST*: this quantifier, like all generalized quantifiers, takes two arguments, so the form of *MOST*-formulas is  $MOST_x(P(x))(Q(x))$ , where *MOST* quantifies over  $x$ 's. This analysis is compatible with any semantics for *MOST*: it may mean 'more than half', 'more than 3/4', or any of the other proposals that have been made. This point is not crucial for me.

- $\llbracket R \rrbracket = \lambda p. [MOST_q(q \in C \wedge q \neq p)(q >_{L_c} p)]$

This entry is of type  $\langle t, t \rangle$ , the same type as *man* or the expletives. We can assume for the nonce that it combines directly with the particles by something like the function composition rule of Heim and Kratzer (1998) This will yield the following lexical entries for particles with R intonation.

- $\llbracket man_R \rrbracket = \lambda p. [p \wedge E(c)(p)(p) \wedge MOST_q(q \in C \wedge q \neq p)(q >_{L_c} p)]$
- $\llbracket fuck_R \rrbracket = \lambda p. [p \wedge very(E(c)(p)(p)) \wedge MOST_q(q \in C \wedge q \neq p)(q >_{L_c} p)]$

These formulas model the meaning of these particles as: first, the proposition they take, second, a statement of some emotion with respect to that proposition, and third, a statement that the proposition is less likely than most other propositions (within some comparison set  $C$ ). The exact identity of the comparison set is determined by contextual factors in a way similar to the covert variable  $C$  made use of by e.g. von Stechow (1994) and Marti (2003) in analyzing quantifier restrictions.

Given this, the semantics of (5.67a) will be as in (5.67b), which is as desired.<sup>19</sup>

(5.67)a. Man, it's raining outside.

---

<sup>19</sup>This logical form assumes that *raining* is a property of world-time pairs. This choice has no deep implications for the analysis and is made just for convenience.

- b.  $raining(w, t) \wedge E(c)(raining(w, t))(raining(w, t)) \wedge MOST_q(q \in C \wedge q \neq raining(w, t))(q >_{L_c} raining(w, t))$

What about the case of RF intonation? As I showed above, this intonation indicates that the speaker is displeased by the propositional content of the sentence; that is, she thinks that that content is bad or disappointing in some way. If this is correct, we can write the semantics of this contour in this simple way:

- $\llbracket RF \rrbracket = \lambda p. [\mathbf{bad}(p)]$

Combined with the semantic frame for the particles, this will yield the following:

- $\llbracket man_{RF} \rrbracket = \lambda p. [p \wedge E(c)(p)(p) \wedge \mathbf{bad}(p)]$
- $\llbracket fuck_R \rrbracket = \lambda p. [p \wedge very(E(c)(p)(p)) \wedge \mathbf{bad}(p)]$

This analysis makes a prediction about when use of the particles with RF intonation will be felicitous. The function  $E$  returns an emotion about a proposition based on its content relative to other properties of the context. If the context is such that the propositional content is perceived as positive, then use of RF intonation on the particle will be contradictory:  $E$  will map the content to **good**, yet the intonational contour will also force inclusion of the meaning **bad**. Since these emotions are incompatible, infelicity will result. The following sentences are instances of this fact; assume that they appear with stand-alone intonation. In these examples, the sentence expresses that the speaker is rich; for most people and contexts, this will be understood as something positive, so  $E$  in the basic semantic representations of the sentences in (5.68), shown in (5.69), is resolved to **good**, as shown in (5.70). However, we now have an incompatibility between the positive meaning contributed by the basic particle meaning and the negative meaning contributed by RF intonation. This semantics, therefore, predicts the infelicity of the examples in (5.68).

- (5.68)a. # Man, I'm rich!  
RF



- b. # Fuck, I'm rich!  
RF

(5.69)a.  $\llbracket 5.68a \rrbracket = rich(i) \wedge E(c)(rich(i))(rich(i)) \wedge \mathbf{bad}(rich(i))$

b.  $\llbracket 5.68b \rrbracket = rich(i) \wedge very(E(c)(rich(i))(rich(i))) \wedge \mathbf{bad}(rich(i))$

(5.70)a.  $\llbracket 5.68a \rrbracket = rich(i) \wedge \mathbf{good}(rich(i)) \wedge \mathbf{bad}(rich(i))$

b.  $\llbracket 5.68b \rrbracket = rich(i) \wedge very(\mathbf{good}(rich(i))) \wedge \mathbf{bad}(rich(i))$

I now move on to consider the meaning of sentence-initial *man* and epithets with integrated intonation, in sentences that express the speaker's judgement.

#### 5.4.4 Meaning of epithets and *man*: degrees

This section considers the meaning of our particles in sentences that express the speaker's judgement about the degree to which some object has a property, such as the example in (5.71).

(5.71) Man, this salsa is hot.

To recapitulate some earlier discussion: here, the speaker is emphasizing how spicy the salsa is, and, depending on intonation, that the degree of that spiciness exceeds his expectation (R), or that he finds the spiciness negative in some way (RF). In essence, though, the attitude of the speaker is expressed with respect to the degree of spiciness the salsa has, not just that with respect to the truth of the proposition itself. In other words, the speaker is expressing surprise (or unhappiness) about *how* spicy the salsa is, not only *that* it is spicy. Compared to the other sections, the discussion here will be inconclusive: my goal here is to lay out the issues and give a partial formal analysis. I will not be able to account for all the properties of the degree-modification reading of *man* here.

In order to talk formally about degrees of properties, I want to introduce some notions from the semantics of gradable adjectives and comparatives. Here I'll

assume a scalar theory of such adjectives (Kennedy, 1999, to appear) on which they denote relations between individuals and degrees, which are a kind of measure of the extent to which a property is held.<sup>20</sup> On such a theory, the logical form of a sentence with an adjectival predicate in the (so-called) absolute construction,<sup>22</sup> like that in (5.71), is as shown below in simplified form.

$$(5.72) \llbracket (5.71) \rrbracket = \text{hot}(\text{this\_salsa})(d_s)$$

In this formula,  $d_s$  refers to a degree which comprises the ‘standard’ for the property in question, here hotness;  $d_s$  thus denotes the degree of spiciness above which a taste can be truly stated to be spicy. In this particular instance,  $d_s$  is contextually determined. The first argument of *hot*, *this\_salsa*, here also denotes a degree: the degree of spiciness that the salsa has. In the model theory, degrees are treated as points in a scale, modelled as a (dense) partial order. Each gradable predicate is associated with a scale. Whether a predicate applies truly to a particular individual depends on the position of the degree associated with that individual on the scale. Kennedy assumes a function  $\delta$  that maps individuals to the degree associated with them;  $\delta$  is relativized to predicates, so there are actually a family of  $\delta$  functions, one for each predicate:  $\delta_{\text{spicy}}$ ,  $\delta_{\text{tall}}$ , and so on.<sup>23</sup> If the degree associated with an individual  $x$ ,  $\delta_P(x)$ , is greater than the standard  $d_s$  (i.e. if  $\delta(x) \geq d_s$ ), then  $P(x)$  is true.

---

<sup>20</sup>I will not discuss the main competing theory of gradable adjectives, the partial logic approach associated with some analyses of vagueness. See Kennedy (1999) for some discussion of the issues involved.

<sup>21</sup>I will also not make use of the theory ultimately espoused by Kennedy (1999), on which gradable adjectives denote functions from objects to intervals on a scale, holding instead to simpler notions of degree. This choice will not affect my main points in any way and does not represent a principled decision but only one made for convenience; the reader is welcome to translate my discussion into Kennedy’s theory if desired.

<sup>22</sup>Absolute constructions are those in which a statement is made about the applicability of some gradable adjective to an individual. This construction should be set against e.g. comparatives, in which the applicability of the adjective is stated only with reference to other individuals.

<sup>23</sup>For some predicates, these scales may be identical, however.

We can use the idea of degrees in understanding the effect of our particles on judgement sentences. Consider again (5.71). The sentence states that the degree of spiciness possessed by *this salsa* is at least equal to that needed to be considered *hot*. Use of sentence-initial *man* has the effect of intensifying the degree of spiciness that the salsa is asserted to have. We can understand this as an additional statement about the *degree* to which the individual has the property in question. I propose that one part of the meaning of the particles when they have integrated intonation is to make a statement about this degree.

Consider the truth conditions of (5.71) on a degree/scale account. The only criterion for truth of the sentence is that  $\delta_{spicy}(this\_salsa) \geq d_s$ . This condition is fairly weak: the salsa could be just slightly spicy, or murderously spicy. Nothing is specified about the exact degree of spiciness it has. The same is true for (5.71) modified by *man*; however, the degree of spiciness is higher than in the null case. How can this difference be handled?

We can look at the analysis of *very* in Klein (1980) to start working toward an answer to this question. Klein's analysis is set within the partial logic approach, and so makes reference to comparison classes. For Klein, *very* introduces a new comparison class: speaking in terms of scales, it removes everything below the standard  $d_s$ , that is, everything that originally did not have the property in question. A new standard  $d_{s'}$  is then set within this new scale. So, for instance, the meaning of *very hot* first picks out the set of things that are hot (that satisfy the condition  $\delta_{hot}(x) \geq d_s$ ), resets the standard to  $d_{s'}$ —a standard for things that are hot, within the class of hot things. Thus something that is *very hot* is something that is hot *compared to* other hot things.

This treatment of *very* suggests a way to think about the contribution of the particles, when they appear with integrated intonation: as operators that change the comparison set with respect to which the predication is made. I suggest that

both the particles and *very* introduce an additional statement about the degree to which the predicated object has the property denoted by the predicate: to a degree greater than most other objects of its type. That is, (5.71) with *man* states that *this\_salsa* is spicier than most salsas. We can write this as follows. Here I follow Kennedy in assuming a denotation of type  $e$  for the definite description, and for referring expressions in general. Nothing crucial rests on this move; it is simple enough to restate the semantics in terms of a generalized quantifier denotation if desired; and indeed, I will move to this sort of analysis later in the chapter. For the time being, I also assume that the demonstrative acts something like a free variable that receives a value from context; for this reason, no existential quantifier appears in the formulas that are based on this analysis.

- $spicy(this\_salsa)(d_s) \wedge most_y(salsa(y))(\delta_{spicy}(y) \ll \delta_{spicy}(this\_salsa))$

Abstracting from this formula, we get the following formula. Here  $x$  is the variable introduced by the subject,  $P$  a property that characterizes the subject (in (5.71), that it is salsa) that provides a class of objects that are comparable to the predicated individual in terms of the scale, which is represented by  $S$ . For now, assume that  $P$  is identified by contextual factors. There are actually complex issues associated with this identification, but I will delay introducing them for a bit longer.

- $\lambda x.[\lambda S.[P(x) \wedge S(x)(d_s) \wedge most_y(P(y) \wedge x \neq y)(\delta_S(y) \ll \delta_S(x))]]$

which must then be augmented with the analysis of emotional content in the previous section and with the content of the assertion itself. Doing so yields the following as the base meanings of *man* and expletives with integrated intonation.

- Integrated particles (first attempt):
- $[[man_i]] = \lambda x.[\lambda S.[P(x) \wedge S(x)(d_s) \wedge most_y(P(y) \wedge x \neq y)(\delta_S(y) \ll \delta_S(x)) \wedge E(c)(P(x))(P(x) \wedge S(x)(d_s) \wedge most_y(P(y) \wedge x \neq y)(\delta_S(y) \ll \delta_S(x)))]]$

- $\llbracket fuck_i \rrbracket = \lambda x. [\lambda S. [P(x) \wedge S(x)(d_s) \wedge most_y(P(y) \wedge x \neq y)(\delta_S(y) \ll \delta_S(x)) \wedge very(E(c)(P(x))(P(x)) \wedge S(x)(d_s) \wedge most_y(P(y) \wedge x \neq y)(\delta_S(y) \ll \delta_S(x)))]]$

This seems to give us what we need: these lexical entries state that the object has the gradable property in question (with respect to some contextually determined standard of spiciness), that it has that property to a degree higher than most other, similar, objects, and that the speaker has some attitude toward these facts .

Something is still missing, however; the contribution of intonation to the meaning of the particles. In a certain sense it's simple enough—we merely need to combine the meaning of the pitch accents with the meaning of the particles—but there are issues in how the composition takes place. Specifically, there are concerns about the types. I previously assumed that both the particles and the pitch accents were of type  $\langle t, t \rangle$ ; since these types are the same, it is easy to combine these using something like the functional composition rule of Heim and Kratzer (1998). But now the types do not match, so function composition can't work.

This problem can probably be solved by assuming a polymorphic type for pitch accents. Unfortunately I do not know just how this should be done at present. Instead I'll assume two lexical entries for the pitch accents: one that takes a proposition and one that takes an object of a more complex type; the first lexical entry is just that given above. I will delay providing the second entry until after I have finalized the type for the integrated particles, which I will do very shortly.

A question now arises as to the cases of particles with integrated intonation and R pitch accent. What is the object of the 'surprise' expressed by these constructions? On the semantics I have given, there are several distinct possibilities (disregarding the obviously wrong ones that involve statements of speaker emotion and the other elements of the lexical entry).

1. Surprise is expressed toward the proposition itself.

2. Surprise is expressed toward the degree to which the individual has the gradable property, or to the degree to which its degree of property-having exceeds that of other comparable individuals.
3. Surprise is expressed toward some combination of these things.

It seems to me that the right choice here is (3): in an utterance like *Man, this sofa is heavy!*, the speaker seems to be expressing surprise at the degree to which the sofa is heavy, and so, on a degree analysis of gradable predicates, both the proposition itself and to the statement about its likelihood (compared to other relevant sofas). If this intuition is correct, then the object of surprise is the quantificational statement about degrees ( $MOST_y \dots$ ) in conjunction with the simple predication of the gradable adjective on the subject. So, for integrated particles, we need a statement like the following when R is used.

- $[[man_i]]$  (second attempt) =  $\lambda x. [\lambda S. [P(x) \wedge S(x)(d_s) \wedge most_y(P(y) \wedge x \neq y)(\delta_S(y) \ll \delta_S(x)) \wedge E(c)(P(x))(P(x) \wedge S(x)(d_s) \wedge most_y(P(y) \wedge x \neq y)(\delta_S(y) \ll \delta_S(x))) \wedge MOST_q(q \in C \wedge q \neq p \wedge p = [P(x) \wedge S(x)(d_s) most_y(P(y) \wedge x \neq y)(\delta_S(y) \ll \delta_S(x))])](q >_{L_c} p)]]$

This formula is very complex, but it seems to be more or less what is needed. Applied to (5.73a), it yields (5.73b):

(5.73)a. Man, this sofa is heavy.

- b.  $sofa(x) \wedge heavy(sofa)(d_s) \wedge most_y(sofa(y) \wedge x \neq y)(\delta_{heavy}(y) \ll \delta_{heavy}(x)) \wedge E(c)(sofa(x) \wedge heavy(sofa)(d_s) \wedge most_y(sofa(y) \wedge x \neq y)(\delta_{heavy}(y) \ll \delta_{heavy}(x))) \wedge MOST_q(q \in C \wedge q \neq p \wedge p = [sofa(x) \wedge heavy(x)(d_s) \wedge most_y(sofa(y) \wedge x \neq y)(\delta_{heavy}(y) \ll \delta_{heavy}(x))])](q >_{L_c} p)$

In words, according to this formula, (5.73a) means: the sofa is heavy, it is heavier than most sofas, the speaker has some attitude, most likely negative, toward this

heaviness, and the sofa being this heavy is less likely than most propositions in the restricting set  $C$ , which in this case might include other properties of sofas, of this sofa in particular, etc.

This analysis looks quite attractive. It gives the right meanings, and also explains a number of independent facts about the particles: in particular, why they can have integrated intonation only with gradable predicates. The reason is that only in the presence of a gradable predicate will the right configuration be available for the semantic combinatorics of the sentence to result in a truth value, or an input to dynamic interpretation, as the reader prefers; I assume the latter, but as the analysis in no way hinges on dynamics, it can easily be placed within a purely truth-conditional framework. The reason for the incompatibility of non-coerced predicates is simply that the function  $\delta_s(x)$  is not defined.

There is a question now though about how to incorporate this into the analysis of the particles given so far. Up to this point, we have analyzed the particles as propositional operators of type  $\langle t, t \rangle$ ; and this indeed seems to be correct. But such an analysis is not easily compatible with the formula above, which is of type  $\langle e, \langle \langle e, t \rangle, t \rangle \rangle$ . What should one say about this? There are actually several problematic points.

Our current picture looks like this. Both *man* and the expletives come in two distinct types, one which applies to propositions as a whole, and one which takes in succession a null morpheme that contextually determines a comparison class, a quantifier, and a property, yielding a truth value. arise. First, is it possible to derive one of the two types from the other? That is, could we take one type, either  $\langle t, t \rangle$  or  $\langle \langle e, t \rangle, \langle \langle e, t \rangle, t \rangle, \langle \langle e, t \rangle, t \rangle \rangle$  and derive the other from it using some sort of type-shifting operation? One would like to. But I don't think that it's possible, given the rather distinct content of the two. A crucial point in the semantics of integrated particles is that they must apply to gradable predicates; even in cases

like (5.74) where the predicate is not ordinarily gradable, *won* is interpreted in a gradable way: the intuition is that (5.74) means that the Republicans won the election to an extreme degree, perhaps by getting more votes than expected or by sweeping both houses (the actual case). This interpretation presumably results from coercion of some sort; I will not explore the details of how this might be formally worked out here, but instead refer the reader to Pustejovsky (1995) and de Swart (1998) for more on coercion. The main point is that without a notion of gradability in the semantics, we simply will not get the right interpretation for examples with integrated particles, suggesting that an attempt to derive the meaning of integrated particles from independent particles is doomed to failure.

(5.74) Man, the Republicans won the 2002 elections. (integrated intonation)

A way out might be to put some notion of gradability into the semantics of the independent particles as well; but a moment's reflection is enough to see that this will not serve, for there is no semantic gradability in their semantics. This move will lead to problems in the interpretation of independent particles, as will any attempt to derive the meaning of independent particles from the integrated particle semantics. The upshot of this discussion is that the two distinct meanings should be given separately in the lexicon, as I have already done.

Now, the type of the first argument in the proposed lexical entries is clearly not right; it is time to turn back to my promissory note about the inadequate treatment of demonstratives as type  $e$  individuals. I will assume that *this*, *that*, etc. denote quantifiers; that is, they are of type  $\langle\langle e, t \rangle, \langle\langle e, t \rangle, t \rangle\rangle$ . The reason for this move is that demonstrative pronouns can take NP complements in general: thus we have so-called 'complex demonstratives' of the form *Dem NP* like *this guy* or *that cat*. To generalize this analysis to cases where no overt NP-complement is present, I must assume that the 'bare' demonstratives have sisters of type  $\langle e, t \rangle$ , that is, properties; this should be an empty category which I will write  $\emptyset$ . These are interpreted as



anaphoric properties of some sort, generally picked out by a ‘pointing’ gesture in the manner described by Kaplan (1989).<sup>24</sup> With this denotation for demonstratives, the particle must take a generalized quantifier rather than an individual. But this is a very straightforward fix.

The next point that needs to be treated is how the comparison works. What is at issue is how the comparison class is determined. This issue is by far the most problematic, and I will not be able to propose a final solution, which I will have to leave to future research.

First I want to clarify what I mean by the comparison class. In the literature one finds discussion of comparison classes related to determining the value of  $d_s$ , the degree above which a predicate holds of an individual (Kennedy 1999; Heim 1999, *i.a.*). For our standard example this corresponds to determining what qualifies as *spicy*. In the literature this is often taken to be contextually determined, e.g. by assuming the presence of a null morpheme attaching to the comparative (*man*, for us). This approach is relatively unproblematic, although even here there are locality-related issues that I will come back to at the end of the chapter. What I want to worry about before that is the question of how the comparison class for the *MOST* quantification that compares the *P*-ness of the subject with the *P*-ness of other objects of a similar type works; how is it determined what objects are to be compared to the subject? Unlike the question of how one determines the contextual standard, this question has not been looked at in detail for the case at issue, though it has, to some degree, for the case of comparatives.

The space of possibilities is constrained by the fact that, as far as I have been able to determine, the object is always compared to other objects that have

---

<sup>24</sup>This analysis of demonstratives may be controversial. There are many issues surrounding the semantics of demonstratives; Dever (2001) provides an overview of some of them. The story I propose, on which simple demonstratives are assimilated to complex demonstratives, may not be compatible with some analyses in the literature. I will not be able to explore all these issues in this dissertation.

whatever property is used to pick out the object in the first place—that is, other objects of which the NP predicate in the subject, in examples like (5.75a), or object, for examples like (5.75b), holds.

- (5.75)a. Man, this salsa is spicy.  
b. Man, this is spicy salsa.

There are two ways to deal with this fact. The first is to assume some sort of syntactic movement and have the NP complement of D move to adjoin to the particle; this movement will put it in the right position for its property denotation to apply to the particle semantics and yield a restrictor for the quantification. While this seems at first glance to work out, it's not clear that the movement is motivated, and indeed, movement of this type (of a D-complement only) does not seem to be found elsewhere. There is also a technical problem that arises; given that *man* is adjoined to CP, adjoining the NP to it will cause the NP-trace to become unbound, resulting in a property denotation. One must do some fancy footwork then in the denotation of the particle to make the sentence denote a saturated proposition. These two reasons together strike me as sufficient to warrant looking for another approach. Note though that if one assumes a version of the 'glue semantics' used in LFG and HPSG (see e.g. Dalrymple 2001 for details), one need not make the assumption of literal movement and can avoid some of the problems I discuss.<sup>2526</sup>

The second option is to assume that both the comparison classes are contextually determined. On this kind of account, the particle would be associated with two distinct null elements, one to determine  $d_s$  and one to determine the set

---

<sup>25</sup>Within resource-based logics, one can simply assume that *man* processes particular resource—e.g. the property denotation of the NP can be input to the particle, which can then re-output it along with the modified particle denotation, along the lines of the treatment of anaphora in glue semantics.

<sup>26</sup>There are reasons to think that a movement-based approach might have some advantages, however. Degree modification with particles exhibits some locality restrictions. I will discuss this at the end of the chapter.

of elements over which the particle's *MOST* element quantifies. This approach is, if anything, even more problematic than the other. There are at least two problems here. The first is conceptual. Given that the *MOST* part of the particle semantics always quantifies over elements of the same type as the NP complement of D, it seems odd to propose that this comparison element is contextually determined: only a rather weird picture of contexts could produce the needed result here. And, further, this seems to be the wrong way to go in any case, given that it looks very much like this comparison set is grammatically determined. But this is a fairly conceptual issue. There is also a more concrete technical issue. Using contextually determined null elements means that the particle will ultimately combine with a proposition. But then it's hard to see how the comparison between elements can be carried out in a compositional fashion, because the particle will no longer have direct access to the predicate. One would need to define a notion of the degree to which a proposition holds, but doing so is not in any way straightforward.

At this point, then, the movement approach or its resource logic variant seems like the better option. It incorporates the uncontroversial part of the contextual variable approach—that (some) comparison classes are given by context—while avoiding the problem of trying to run comparisons over propositions. However, it has the drawback of needing to assume problematic sorts of movement or, alternatively, introduce complex systems of resource logics.

I would now like to introduce some additional data that also needs to be accounted for. So far we have seen examples in which the gradability comes out of an adjectival predicate in the object, or out of the sentential predicate (i.e. the verb or a subject NP-modifying adjective). One wonders whether *any* gradable predicate can serve as input to the particle. The answer is a definite no.

First, gradable adjectives modifying the subject NP are not available for the particle. Consider the following contrast (assume integrated intonation):

(5.76)a. Man, you ate some spicy salsa.

b. Man, some spicy salsa fell on the floor.

In (5.76a), the particle modifies the degree of spiciness of the salsa; but in (5.76b), the spiciness is not available anymore. The sentence can only mean that the falling was in some way extreme: it was sudden or violent, the jar broke into smithereens, it was loud, etc. We can find a similar contrast even with passives.

(5.77)a. Man, you ate some spicy salsa.

b. Man, some spicy salsa was eaten by you.

To the extent the passive sentence here makes sense with the particle, it is clearly the eating event that is modified. I conclude that subject-NP internal predicates are not available for modification by sentence-initial particles. It isn't easy to see how these facts will fall out of an analysis that tries to pick out a comparison set by using a contextually determined predicate. These facts seem to provide further support for a movement-based analysis.

Interestingly, particle modification also shows locality constraints. *Man* cannot modify gradable predicates within embedded sentences, as shown by the following examples.

(5.78)a. Man, John thinks Bill ate some spicy salsa.

b. Man, Jimmy knows Fred has a beautiful girlfriend.

c. Man, it's too bad this data is so complicated.

Here, the particle can only modify the 'embedders'—*think*, *know*, *be too bad*. The more obviously gradable adjectives within the embedded clauses are not available at all; one cannot understand the adjectives as modified even in the most marginal way. This makes things look even worse for the contextual analysis discussed above; there seems to be no obvious reason why an intervening CP should make a particular

comparison class more or less salient. Here it looks like some sort of movement issue is at work, though I have not yet identified what.

However, there is some freedom as to what predicate the particles modify. In examples in which there is more than one (potentially) gradable predicate, it seems that either can be modified.

(5.79) Man, George Bush won a hard election.

Here either the extent of the victory or the hardness of the election can be modified.

A final issue involves coordinations. The two conjuncts of a coordination do not seem to be created equal when it comes to particle modification. Consider the following examples.

(5.80)a. ? Man, the book John bought was expensive and interesting.

b. Man, the book John bought was expensive but interesting.

(5.81) Man, that was some spicy and tasty salsa.

(5.80a) does not seem so good to me. But to the extent that it is good, the particle seems to be modifying both of the predicates. In the second example with *but*, the first conjunct *expensive* is clearly what is modified. The reading on which the second conjunct is modified is very marginal. Contrast these with (5.81), which is perfectly grammatical and where both conjuncts seem to be modified. I do not know what causes the difference between these cases.

In sum, the paradigm of particle degree modification is rather complicated. The tentative semantics I gave above handles only a very small range of cases. I do not presently know how to generalize it to the whole range in any principled way, especially given that it is not clear to me yet exactly what is going on. I leave this problem for future research.

## Chapter 6

# Discourse Particles and Japanese Adverbials

This chapter considers the semantics and pragmatics of three Japanese adverbial expressions: *yoku*, *yokumo*, and *sekkaku*, instances of which are shown in (6.1), (6.2), and 6.3), respectively.

- (6.1) a. *Yoku* koko ni kita na!  
YOKU here to came PT  
'You came here, and I am surprised/happy that you did.'
- b. *Yoku* ore o damasita na!  
YOKU me ACC tricked PT  
'You tricked me, and I am surprised you were able to.'
- (6.2) a. *Yokumo* koko ni kita na!  
YOKUMO here to came PT  
'You have a lot of guts to come here!'
- b. *Yokumo* ore o damasita na!  
YOKUMO me ACC tricked PT  
'I can't believe you had the gall to trick me.'

- (6.3) a. sekkaku tukutta noni tabenai no?  
 SEKKAKU made even-though eat-not Q  
 ‘Even though I made this you aren’t going to eat it?’
- b. sekkaku-no umai sake dakara nomoo yo  
 SEKKAKU-GEN tasty alcohol so drink-HORT PT  
 ‘We’ve fortunately got this nice liquor so let’s drink it (anyway).’

The purpose of this chapter is to describe the meaning, distribution, and felicity conditions of these adverbials, and to provide a formal account of them within a version of dynamic semantics. I will show that *yoku* and *yokumo* exhibit restrictions on their use both in terms of the information state of the hearer and in the sort of propositions they can modify; in addition, issues regarding the deniability of propositions marked with these adverbials require a fairly complex analysis of their meaning. In what follows, I will often write *yoku(mo)* to mean ‘*yoku* and *yokumo*’, where the two exhibit similar behavior. *Sekkaku*, while it does not make demands on hearer information, exhibits many of the same restrictions of *yoku(mo)* with regard to purely semantic distribution.

## 6.1 *Yoku(mo)*

We can think of *yoku* and *yoku(mo)* as expressing the attitude of the speaker to the proposition  $\varphi$  in their scope. Both express that  $\varphi$  is surprising, but differ in that *yoku* expresses that the speaker feels positively about  $\varphi$ , while *yokumo* expresses that the speaker feels negatively about  $\varphi$ . Other subtle differences exist, as will be shown below.

It should be noted that other uses of *yoku* (but not *yokumo*) exist, on which it means ‘often’ or ‘well,’ as in (6.4a) and (6.4b) respectively. This pattern, in which a complex use of an adverbial is parasitic on a more extensional use, is common cross-linguistically. Waltereit (2001) cites German *ja*, which means ‘yes’ but also

can be used as a modal particle, and *eigentlich*, which ordinarily means ‘proper’ but also has a use as a relevance-marking particle. The particle use of *ja* will be discussed further in a later section.

- (6.4) a. Taro ga yoku biiru o nomu  
 Taro NOM often beer ACC drinks  
 ‘Taro often drinks beer.’
- b. Kono ronbun wa yoku dekita mon da ne.  
 this paper TOP well done thing COP PT  
 ‘This paper is nicely done.’

### 6.1.1 Characterizing the meaning of *yoku(mo)*

I argue that the meaning of *yoku(mo)* is complex, and includes a statement of the speaker’s attitude to the proposition in the adverbial’s scope and location of that proposition on an exclamative-like scale of likelihood.

A first attempt at the compositional semantics of the two adverbials might look like this:

- $[[yoku]] = \lambda p.[p \wedge \mathbf{good}(p)]$
- $[[yokumo]] = \lambda p.[p \wedge \mathbf{bad}(p)]$

This is not quite right, for a number of reasons. The first reason is that there is a crucial difference between *yoku* and *yokumo*: the former may express a *general* attitude, while the latter may not.

In the following example, use of *yokumo* indicates that the Kings’ victory was bad *for the speaker* in some way, perhaps a lost bet. *Yoku*, conversely, simply expresses regard for the Kings’ success.

- (6.5) a. Kings-wa yoku Wolves-ni geemu-wan de kateta na  
 Kings-TOP YOKU Wolves-DAT game-one in could-win PT  
 ‘I’m amazed and pleased that the Kings beat the Wolves in Game 1.’



- b. Kings-wa yokumo Wolves-ni geemu-wan de kateta na  
 Kings-TOP YOKUMO Wolves-DAT game-one in could-win PT  
 ‘I’m shocked and personally inconvenienced by the fact that the Kings  
 beat the Wolves in Game 1.’

Thus the semantics must express that the **badness** affected the speaker in the *yokumo* case. It is simple to modify the lexical entry for *yokumo* to reflect this difference. Here **bad**(*s, p*) should be read ‘*p* is bad for the speaker’:

- $\llbracket yokumo \rrbracket = \lambda p. [\mathbf{bad}(s, p)]$

However, these lexical entries still do not capture the full meaning of the adverbials, for two reasons. First, the meaning of the adverbials includes an element of shock or surprise that does not appear yet in the semantics. Second, there are complex issues with the *deniability* of sentences including *yoku(mo)*.

### Problem 1: Exclamatives

I will claim that the semantics of *yoku(mo)* is related to that of exclamatives like the sentence in (6.6), and that the ‘surprise’ part of their meaning comes from this scalar component.

(6.6) What a nice guy John is!

Exclamative clauses have several properties related to *yoku(mo)* (Zanuttini and Portner, 2003): first, they are factive, and second, the proposition that is the denotation of the clause is located at the end of a pragmatically determined scale: often a scale of likelihood. *Yoku(mo)* does not seem to be factive in the standard sense, for reasons to be discussed below, although sentences including *yoku(mo)* do entail the truth of the modified proposition. However, the meaning of these adverbials does seem to have a scalar component.

I use the following scale, which is based on discussion of *even* in Guerzoni 2003; this is the same scale used in chapter 4 in the analysis of the sentence-initial

particles. In words,  $\varphi$  is more likely than  $\psi$  in  $w$  iff, given a contextually relevant set of facts, the likelihood of  $\varphi$  is greater than that of  $\psi$ .

- $\varphi >_{L_w} \psi$  iff  $\Gamma \models \text{Likelihood}(\varphi) > \text{Likelihood}(\psi)$ , where  $\Gamma$  is a set of contextually relevant facts in  $w$ .

Given this scale, we may revise the entries for *yoku* and *yokumo* as follows, where  $C$  is a set of contextually relevant propositions which are also on the scale of likelihood. :

- $\llbracket yoku \rrbracket = \lambda p. [p \wedge \mathbf{good}(p) \wedge \forall q \in C [(p \neq q) \rightarrow q >_{L_w} p]]$
- $\llbracket yokumo \rrbracket = \lambda p. [p \wedge \mathbf{bad}(s, p) \wedge \forall q \in C [(p \neq q) \rightarrow q >_{L_w} p]]$

These formulas state that  $yoku(mo)(\varphi)$  is true iff  $\varphi$  is **good/bad** and is the least likely proposition in  $w$  of some set of propositions, given a set of contextually relevant facts.

The denial problem will be addressed after the next section, in which I will set up some background.

### 6.1.2 Particles and information states

This section addresses the following observation: both *yoku* and *yokumo* require that the proposition to which they apply already be in the common ground. This fact can be seen clearly by attempting to use them in answers to questions (cf. Kratzer 1999), which must express new information from the perspective of the questioner (barring rhetorical questions). In this context, use of *yoku(mo)* is impossible.

- (6.7) a. Context: A asks B ‘Who did Austin marry?’
- b. \*Yoku Dallas to kekkon sita na!  
 YOKU Dallas with marry did PT  
 ‘He did a really good and surprising thing by marrying Dallas!’

- (6.8) a. Context: A asks B ‘Who did Austin marry?’
- b. \*Yokumo Dallas to kekkon sita na!  
 YOKUMO Dallas with marry did PT  
 ‘He did an amazingly stupid and shocking thing by marrying Dallas!’

The badness of the examples above shows that *yoku(mo)* cannot simply be analyzed as factive, for if it could, the proposition in its scope could be accommodated in this situation; the question itself indicates A’s willingness to accommodate.

However, it is perfectly possible to use *yoku(mo)* if the proposition it applies to is already in the common ground, as in (6.9). Here, since my friend is aware of his own actions, he already knows that he has drawn the picture in question.

- (6.9) a. Situation: I go to a gallery where a painting by a friend of mine is being exhibited. I am surprised at the quality of his work. A few minutes later he shows up and I say:
- b. omae-wa yoku konna e-o kaketa  
 you-TOP YOKU this-kind-of picture-ACC could-draw  
 ‘I can’t believe you could draw a picture this good.’

I model the requirement for hearer knowledge using the dynamic system developed by Asher and McCready (2004) and discussed in detail in an earlier chapter. Within this system, a given utterance can be associated with conditions on the ISs of speaker and hearer. In particular, the knowledge condition on *yoku(mo)* can be characterized as follows:

- $\sigma + yoku/yokumo(\varphi) = \sigma'$  if
  - $\mathcal{B}_S \mathcal{B}_H \varphi$ , and
  - $3(\sigma) + \varphi = 3(\sigma')$
- else  $\emptyset$ .

In words: for the update to be defined, all the speaker's epistemic possibilities must verify  $\varphi$  and that the hearer believes  $\varphi$  to be true. Assuming mutual knowledge, the result is that  $\varphi$  must be in the common ground.

What happens when it's not clear whether the hearer already knows  $\varphi$ ? The condition above is not satisfied in this situation. It seems that, in this case, the sentence-final particle *na* is obligatory.

(6.10) When  $\varphi = \textit{came\_here}(j) \notin CG$ :

- a. # John yoku(mo) koko ni kita!  
     John YOKU(MO) here to came  
     ‘John was really good (had a lot of guts) to come here!’
- b. John yoku(mo) koko ni kita na!  
     John YOKU(MO) here to came PT  
     ‘John was really good (had a lot of guts) to come here!’

Among many other uses (Moriyama, 2001; Noda, 2002), *na* can be used to emphasize and seek agreement on a statement.

(6.11) kinoo ame-ga ippai futta na  
       yesterday rain-NOM lots fell PT  
       ‘It rained a lot yesterday.’

Here, the speaker emphasizes his own belief that ‘it rained a lot yesterday’, and expresses the belief that the hearer is aware of this fact and agrees with his judgement about it. One way to understand this intuition is that use of the particle implies the speaker's certainty that  $\varphi$  is true and that the hearer also believes so. We can characterize this idea as follows in our system:

- $\llbracket na \rrbracket = \lambda p.NA(p)$
- $\sigma + NA(\varphi) = \langle 1(\sigma), 2(\sigma), 3(\sigma) + \varphi \rangle$  if:

- $3(\sigma) + \varphi = 3(\sigma)$
- $\mathcal{B}_S \mathcal{B}_H \varphi$
- $\exists \epsilon \in 3(\sigma)[\epsilon + \varphi = \epsilon]$

else  $\emptyset$ .

On this analysis, *na* is eliminative just in case: the proposition in its scope is entailed by all the speaker’s epistemic possibilities, the speaker believes that the proposition is believed by the hearer, and the hearer has not already rejected the proposition. Use of *na* thus expresses a stronger claim by the speaker than an ordinary assertion due to the constraints on its use. The strength of this claim leads to the emphatic quality of *na*-marked assertions, and the possibility of accommodation by the hearer.

### 6.1.3 Denials

Having set the stage, we may now return to the lexical semantics of these adverbials. What happens when *yoku(mo)+ $\varphi$*  is denied? The above analysis predicts several possibilities, each corresponding to one bit of the semantics (see Faller 2002 for more on this ‘denial test’).

- Case 1: Hearer’s information state does not actually support  $\varphi$ . Then the truth of  $\varphi$  is denied.
- Case 2: Hearer’s IS supports  $\varphi$  but not **good/bad**( $\varphi$ ). Then the appropriateness of the attitude is denied.
- Case 3: Hearer’s IS supports  $\varphi$  and possibly **good/bad**( $\varphi$ ), but not that  $\varphi$  is unexpected. Then the unexpectedness is denied.
- Case 4: Hearer’s IS supports  $\varphi$  but neither of the other parts, which are then both denied.

The semantics provided above predicts that Case 1 is impossible, because  $\varphi$  must already be in the hearer's IS for the sentence to be successfully processed, but that cases 2-4 are possible. Let us see whether these predictions are borne out.

(6.12)A: Taro-ga yoku annani ii e-o kaketa na  
 Taro-NOM YOKU that-kind-of good picture-ACC could-draw PT

'I'm surprised and pleased that Taro could draw such a good picture.'

a. B: #Usō da!  
 lie COP  
 'That's a lie!'

b. B: Tigau yo!  
 wrong PT  
 'That's wrong!'  $\implies$  'It's not that positive a fact.' OR 'It's not that surprising.'

c. B: sonna koto nai yo  
 that-kind-of thing COP.NEG PT  
 'That's not right.'  $\implies$  'It's not that positive a fact.' OR 'It's not that surprising.'

(6.13)A: Taro-ga yokumo ano ko-o nagutta na  
 Taro-NOM YOKUMO that kid-ACC hit PT

'I'm surprised and shocked that Taro hit that kid.'

a. B: #Usō da!  
 lie COP  
 'That's a lie!'

b. B: Tigau yo!  
 wrong PT  
 'That's wrong!'  $\implies$  'It's not that positive a fact.' OR 'It's not that surprising.'

- c. B: *Sonna koto nai yo!*  
 that-kind-of thing COP.NEG PT  
 ‘That’s not right.’  $\implies$  ‘It’s not that positive a fact.’ OR ‘It’s not that surprising.’

As it turns out, Case 1 is indeed impossible. This is unsurprising: since  $\varphi$  must be supported, it may not be denied felicitously. The analysis so far gets this right. Cases 2 and 3 are both possible. This is also predicted. Case 4 is impossible. This is surprising. Some modification seems necessary.

Before doing this modification, however, one may wonder why denial with *uso* ‘lie’ is impossible. I believe that the cause of this is just that A has privileged access to his own mental states (Mitchell, 1986), so B is able only to question the characterization, not to dispute its sincerity. (6.14) is bad for the same reason.

- (6.14)a. A: I’m cold.  
 b. B: # That’s a lie!

I will present a solution to the denial problem that makes crucial use of speech acts as related to discourse structure. This solution will be situated within Segmented Discourse Representation Theory (SDRT; Asher and Lascarides 2003). I argue that *yoku(mo)* introduces a complex SDRS-condition (cf. the analysis of parentheticals in Asher 2000). The basic idea is that *yoku(mo)* has a complex meaning. On my analysis, it introduces into the discourse model three distinct propositions: the proposition  $\varphi$  already assumed to be present in the ISs of speaker and hearer, a proposition that expresses the speaker’s attitude toward  $\varphi$  (generally **bad**), and a proposition that locates  $\varphi$  on a scale of likelihood, just as discussed earlier. The difference from the earlier proposal is that each of these propositions is taken to be labeled with a distinct speech act referent; as with Asher’s (2000) analysis of parentheticals, the effect of this move is that the content of the subordinate speech

acts does not participate in relations with logical operators such as modals and conditionals, as needed for examples like (6.15). The speech act referents introduced by *yoku(mo)* are then connected by underspecified discourse relations.

- (6.15)a. If the party, an uninteresting social gathering, is over, then we should find somewhere else to get a drink. (Asher 2000)
- b.  $\neq$  If the party is over and the party is an uninteresting social gathering, then we should find somewhere else to get a drink.

This idea can be integrated into the *yoku(mo)* semantics as follows. The semantic representation of *yoku(mo)* given above corresponds to the following group of SDRS-conditions. I ignore the speaker orientation of *yokumo* for simplicity.

$\pi_1 : \varphi$   
 $\pi_2 : \mathbf{good/bad}(\varphi)$   
 $\pi_3 : \forall \psi \in C[(\psi \neq \varphi) \rightarrow \psi >_{L_w} \varphi]$   
*Commentary*(?,  $\pi_2$ )  
*Background*(?,  $\pi_3$ )

The attachment points of  $\pi_2$  and  $\pi_3$  are not set. I assume a constraint on attachment such that both  $\pi_2$  and  $\pi_3$  must attach to  $\pi_1$ . Crucially, however, the *order* in which they attach, is underspecified. This yields two possibilities:

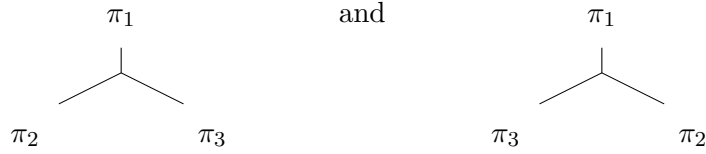
$\pi_0, \pi_1, \pi_2, \pi_3$
$\pi_1 : \varphi$ $\pi_2 : \mathbf{good/bad}(\varphi)$ $\pi_3 : \forall \psi \in C[(\psi \neq \varphi) \rightarrow \psi >_{L_w} \varphi]$ <i>Commentary</i> ( $\pi_1, \pi_2$ ) <i>Background</i> ( $\pi_1, \pi_3$ )

and



$\pi_0, \pi_1, \pi_2, \pi_3$
$\pi_1 : \varphi$
$\pi_2 : \mathbf{good/bad}(\varphi)$
$\pi_3 : \forall \psi \in C[(\psi \neq \varphi) \rightarrow \psi >_{L_w} \varphi]$
$Background(\pi_1, \pi_3)$
$Commentary(\pi_1, \pi_2)$

Taking discourse relations to connect nodes, these representations correspond to the following graphs:

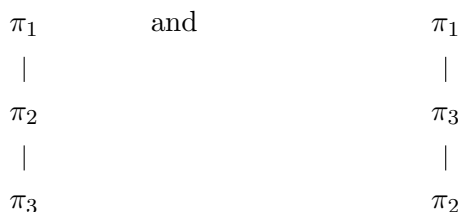


where  $Commentary(\pi_1, \pi_2)$  and  $Background(\pi_1, \pi_3)$ .

In SDRT, denial targets a single SDRS (Asher and Lascarides, 2003). The targeted SDRS must be on the right frontier of the discourse structure:  $\pi$  is available only if it is the most recent utterance or lies on a path between the node representing it and the root of the graph. Given the structures above, it is only possible to target  $\pi_1, \pi_2$ , or  $\pi_3$ . Targeting  $\pi_2$  with negation yields Case 2: denial of the attitude. Targeting  $\pi_3$  yields Case 3: denial of surprisingness. It is also possible to target  $\pi_1$ . In SDRT, when an SDRS is denied, SDRSs that are connected to it with veridical subordinating relations are also denied; that is, denial is transitive through veridical relations. Veridical relations are those that fulfill the following condition:  $R(\pi_i, \pi_j) \rightarrow \mathfrak{M}, i \models \mathcal{K}_{\pi_i} \wedge \mathcal{K}_{\pi_j} \wedge \phi_R$ , where  $\phi_R$  is the content introduced by the relation. Veridical relations thus are those relations that entail the truth of the two SDRSs they connect, as well as the truth of any additional content that comes from the relation itself. In SDRT, Commentary and Background are veridical relations. Therefore, if denial targets  $\pi_1, \pi_2$  and  $\pi_3$  in the structure above are also denied by transitivity. However, since  $\pi_1$  is already supported by the input state, targeting it

results in a contradiction and thus infelicity.

Interestingly, some speakers seem to allow denying the attitude and scalar content simultaneously. For such speakers, the condition requiring attachment to  $\pi_1$  does not seem to hold. In this case, the range of attachment possibilities widens significantly, admitting the following structures:



In the structure on the left, two possibilities exist for denials. Denial may either target  $\pi_3$ , in which case the surprisingness of the proposition is denied, or it may target  $\pi_2$ . In this second case,  $\pi_3$  is also denied, by transitivity. The structure on the right admits a similar range of possibilities. The upshot is that, for these speakers, everything but the modified proposition itself ( $\pi_1$ ) may be denied simultaneously.

What happens when we add the sentence-final particle *na* to the SDRS? It must apply to the first proposition—that is, to the content of  $\pi_1$ , in order to ensure the right conditions on the input state. Thus, only the content of  $\pi_1$  changes with the addition of *na*, meaning that the following SDRSs can be constructed:

$\pi_0, \pi_1, \pi_2, \pi_3$
$\pi_1 : NA(\varphi)$
$\pi_2 : \mathbf{good/bad}(\varphi)$
$\pi_3 : \forall \psi \in C[(\psi \neq \varphi) \rightarrow \psi >_{L_w} \varphi]$
<i>Commentary</i> ( $\pi_1, \pi_2$ )
<i>Background</i> ( $\pi_1, \pi_3$ )

and

$\pi_0, \pi_1, \pi_2, \pi_3$
$\pi_1 : NA(\varphi)$
$\pi_2 : \mathbf{good/bad}(\varphi)$
$\pi_3 : \forall \psi \in C[(\psi \neq \varphi) \rightarrow \psi >_{L_w} \varphi]$
<i>Commentary</i> ( $\pi_1, \pi_2$ )
<i>Background</i> ( $\pi_1, \pi_3$ )

In the remainder of the paper I will use the earlier formalism when writing out lexical entries for *yoku(mo)* to enhance readability.

### German *ja*

A number of researchers have examined the modal use of the German particle *ja* from a semantic perspective in recent years (cf. Kratzer 1999; Potts 2005; Kaufmann 2004b). As it turns out, *ja* and *yoku(mo)* share a number of common properties. First, *ja* also has requirements on hearer knowledge, and cannot be used as the answer to a question (Kratzer, 1999; Kaufmann, 2004b).

(6.16)a. Context: A asks B ‘Who did Austin marry?’ (Kratzer, 1999)

- b. \*Austin hat ja Ashley geheiratet  
 Austin has JA Ashley married  
 ‘Austin married Ashley.’

Second, it appears that *ja* cannot be embedded under modals, which, as we will see shortly, is a property shared by *yoku(mo)*:

(6.17)\*Es ist moeglich, dass Hans ja einen neuen Hund hat.  
 it is possible that Hans JA a new dog has  
 ‘It is possible that Hans JA a new dog has.’

I will have little to say here about the correct analysis of *ja*, but will simply note that the analysis proposed by Kaufmann (2004b) for the ‘shared knowledge’

requirement of *ja* has much in common with mine. Kaufmann analyses *ja*( $\varphi$ ) as presupposing  $\varphi$  within a system of dynamic modal logic. The conditions on input information states I propose are ultimately quite similar. In principle, presuppositions can be accommodated, but Kaufmann shows that the particular presupposition he assumes (that of mutual knowledge) is difficult to accommodate, making predictions similar to my own. I leave open the question of whether his system could also apply to *yoku(mo)*.

#### 6.1.4 Distribution of *yoku(mo)*

This section describes the distribution of these adverbials, which are extremely restricted. In short: *yoku(mo)* is very difficult to embed, and further may only apply to certain types of proposition. I argue that this difficulty stems from two sources: the sentence *yoku(mo)* applies to must describe some actual state of affairs, and the sentence *yoku(mo)* applies to must be asserted. I will provide evidence for this claim from constructions with modals, conditionals, attitude verbs, and negation, showing that *yoku(mo)* is only possible in these cases when the sentence it applies to is coerced to a description of an actual eventuality, or, in the case of attitude verbs, when the sentence can be understood as quotative.

**Modals:** Neither *yoku* nor *yokumo* can appear with future-oriented modals (6.18,6.19), either within their scope, as in (6.18a) and (6.19a), or scoping over them, as in (6.18b) and (6.19b). Note that although I use the possibility modal *kamosirenai* in these examples, the same facts hold for other sorts of future-oriented modals, such as the necessity modal *nitigainai*, although I omit the relevant examples here for space reasons. Past-oriented modals are possible, however, as shown by (6.20).

- (6.18)a. \**[Yoku koko ni kita] kamosirenai na!*  
 YOKU here to came might PT  
 ‘It is possible that you did really well to come here!’

- b. \*Yoku [koko ni kita kamosirenai] na!  
 YOKU here to came might PT  
 ‘It is possible that you did really well to come here!’
- (6.19)a. \*[Yokumo koko ni kita] kamosirenai na!  
 YOKUMO here to came might PT  
 ‘Maybe you have a lot of guts to come here!’
- b. \*Yokumo [koko ni kita kamosirenai] na!  
 YOKUMO here to came might PT  
 ‘Maybe you have a lot of guts to come here!’
- (6.20) omae yokumo konna ii sakuhin dekita n ya na  
 you YOKUMO this-kind-of good artwork was-able-to EMPH COP PT  
 ‘I can’t believe you were able to make a piece this good!’

Why does this restriction exist? Two scopal possibilities exist for these sentences:  $Modal(Adv(\varphi))$ , where the modal scopes over the adverbial, or  $Adv(Modal(\varphi))$ , the opposite scoping. The first case is probably out for pragmatic reasons. Given the discussion in the previous section, the modal applies only to  $\varphi$ , not to the content of the adverbial, yielding  $Modal(\varphi)$ . However, recall that the proposition  $yoku(mo)$  applies to must be already known to the hearer. Given this fact, asserting  $Modal(\varphi)$  would violate Gricean maxims and so be pragmatically odd.

This explanation, however, does not help in understanding why it is impossible to apply  $yoku(mo)$  to  $Modal(\varphi)$ , for this proposition could well still be informative. The reason this scoping is out is, I argue, that  $yoku(mo)$  is lexically restricted so that it cannot be used to indicate one’s attitude to situations that are not actually realized. Since future-oriented modalities by definition describe (possibly) unrealized situations, the scoping in question should be impossible if this hypothesis is correct. Consider the following:

- (6.21)(\*) Taro-ga yoku(mo) raigetu Tokyo ni iku na  
 Taro-NOM YOKU(MO) next.month Tokyo to go PT

‘It’s surprising and good (bad) that Taro will go to Tokyo next month.’

If this sentence is interpreted as expressing an attitude toward Taro’s trip to Tokyo (not Taro’s decision to go to Tokyo next month), infelicity results. Similarly, if we interpret (b) to describe a general capacity rather than one that contributed to the success of a particular action, it is pretty bad; (6.20) in fact does not describe an ability, but the actual fact of having painted a picture of high quality. I will call propositions that describe situations that have occurred in the actual world *actual* propositions.

**Conditionals:** *Yoku(mo)* is also impossible in conditionals: it may not apply to the antecedent or consequent ((a) and (b) for *yoku*, (a,b) for *yokumo*), or to the whole conditional.

- (6.22)a. \*Yoku koko ni kitara, shachoo ga okoru daroo  
YOKU here to came-if, boss NOM get-angry probably  
‘If you do really well to come here, the boss will probably get angry.’
- b. \*Taro ga sake o nomitakattara, yoku koko ni kuru  
Taro NOM alcohol ACC want-drink-if, YOKU here to come  
daroo  
probably  
‘If Taro wants to drink, he will be likely to do really well to come here.’
- (6.23)a. \*Yokumo koko ni kitara, shachoo ga okoru daroo  
YOKUMO here to came-if, boss NOM get-angry probably  
‘If you have a lot of guts to come here, the boss will probably get angry.’
- b. \*Taro ga sake o nomitakattara, yokumo koko ni kuru  
Taro NOM alcohol ACC want-drink-if, YOKUMO here to come  
daroo  
probably  
‘If Taro wants to drink, he will probably have a lot of guts to come here.’

Given the discussion of the modal case, these facts are not unexpected. If  $\varphi$  or  $\psi$  are already known to be true, one should not assert  $\varphi \rightarrow \psi$ ; thus the infelicity of applying *yoku(mo)* to conditional antecedent or consequent. And, if *yoku(mo)* requires that the proposition in its scope be actual, we can also explain why applying *yoku(mo)* to the whole conditional is bad too.

**Negation:** *Yoku(mo)* can appear under negation (6.24,6.25). However, like the modal cases, in these cases the sentence seems to serve as a negative *description* of a positive event (cf. Miller 2003), as in (6.26). If this is correct, then negated sentences provide further evidence that *yoku(mo)* requires actual propositions.

- (6.24)a. Yoku koko ni konakatta na!  
 YOKU here to came PT  
 ‘You didn’t come here, and I am surprised you were able not to.’
- b. Yoku ore o damasanakatta na!  
 YOKU me ACC tricked PT  
 ‘You didn’t trick me, and I am surprised you forbore. (one reading)’
- (6.25)a. \*Yokumo koko ni konakatta na!  
 YOKUMO here to came-not PT  
 ‘You have a lot of guts to not come here!’
- b. \*Yokumo ore o damasanakatta na!  
 YOKUMO me ACC not-tricked PT  
 ‘I can’t believe you had the gall to not trick me.’

(6.26)John saw Mary not leave.

I characterize these facts formally by putting a condition on the type of proposition which can saturate the  $\lambda$ -term in the lexical entry of *yoku(mo)* to the effect that the proposition must describe a situation whose temporal trace is located at a past time. The condition is implemented in the form of a presupposition

(the formula contained within braces in the lexical entries below). Effectively, this condition selects for the set of actual propositions. The final lexical entries for *yoku* and *yokumo* are then as follows, where the predicate  $Desc(e, \varphi)$  is true iff  $\varphi$  describes the eventuality  $e$ :

- $\llbracket yoku \rrbracket = \lambda p \{ \exists e [\tau(e) = t \wedge t < n] \wedge Desc(e, p) \}. [p \wedge \mathbf{good}(p) \wedge \forall q \in C [(q \neq p) \rightarrow q >_{L_w} p]]$
- $\llbracket yokumo \rrbracket = \lambda p \{ \exists e [\tau(e) = t \wedge t < n] \wedge Desc(e, p) \}. [p \wedge \mathbf{bad}(s, p) \wedge \forall q \in C [(q \neq p) \rightarrow q >_{L_w} p]]$

These lexical entries are still not quite right. The first problem relates to the treatment of actuality: I make use of a condition  $(\exists e [\tau(e) = t \wedge t < n])$  that requires the entire runtime of the event in question to be in the past. This is in fact too strong. The reason is that examples in which *yoku(mo)* applies to a sentence describing an ongoing eventuality are fine, as in (6.27).

- (6.27)a. *yoku(mo) sonna tokoro ni sundeiru na*  
 YOKU(MO) that.kind.of place in living NA  
 ‘It’s amazing (shocking) to me that you are living in that kind of place.’
- b. *yoku(mo) anna mono-o tabeteiru na*  
 YOKU(MO) that.kind.of thing-ACC eating NA  
 ‘It’s amazing (shocking) to me that you’re eating something like that.’

The above condition needs to be modified so that ongoing events are allowed for. It is easy to do this: we need only change  $<$  to  $\leq$ , yielding the following lexical entries.

- $\llbracket yoku \rrbracket = \lambda p \{ \exists e [\tau(e) = t \wedge t \leq n] \wedge Desc(e, p) \}. [p \wedge \mathbf{good}(p) \wedge \forall q \in C [(q \neq p) \rightarrow q >_{L_w} p]]$
- $\llbracket yokumo \rrbracket = \lambda p \{ \exists e [\tau(e) = t \wedge t \leq n] \wedge Desc(e, p) \}. [p \wedge \mathbf{bad}(s, p) \wedge \forall q \in C [(q \neq p) \rightarrow q >_{L_w} p]]$



These lexical entries will be given one final further modification below.

**Attitudes:** *Yoku(mo)* cannot be embedded under attitudes in the general case. The sentences below are ungrammatical when *yoku/yokumo* modifies the proposition that is the object of the attitude.

- (6.28)a. \**[Yoku(mo) koko ni kita na] to sinjita*  
YOKU(MO) here to came PT COMP believed  
'(You) believed I was really good (bad) to come here.'
- b. \**[Yoku(mo) koko ni kita] to sinjita na!*  
YOKU(MO) here to came COMP believed PT  
'(You) believed I was really good (bad) to come here.'

They are fine, however, when the object modified by the adverbial is the proposition that such-and-such was believed. (ba), for instance, is acceptable on the interpretation 'You were good to believe that I came here!' Here, *yoku(mo)* modifies the entire sentence, and hence the actual proposition that describes the act of believing.

Why is modification of the embedded sentence impossible? There are two possibilities. One is that the proposition modified by *yoku(mo)* must be *asserted*. If this is correct, we can see why modifying the embedded sentence is impossible: asserting  $Att(x, \varphi)$  does not entail the assertion of  $\varphi$ . A second possibility is that *yoku(mo)* is tied to root clauses, and so cannot apply to embedded sentences except under very special circumstances. (This suggestion is due to Pranav Anand.)

One way to decide between these two possibilities is to examine sentences that lack assertive force, such as questions and imperatives. In these contexts, (at least some) root phenomena are permitted, but since no assertive force is present, elements requiring assertion are not. As the examples below show, *yoku(mo)* is impossible in questions and imperatives, which makes the assertion-based analysis appear to be the correct one.

- (6.29)a. \*Taro-ga yoku(mo) ano ko-o nagutta no ka?  
 Taro-NOM YOKU(MO) that kid-ACC hit EMPH PT  
 ‘Was Taro good (bad) to hit that kid?’ (bad unless echo question)
- b. \*yokumo sara-o arattekoi!  
 YOKUMO plate-ACC wash-come-IMP  
 ‘Go wash the plates and surprise and inconvenience me by doing so!’

**Quotatives:** *Yoku(mo)* can be embedded under attitude verbs just in case that verb can be construed as quotative, as in (6.30).

- (6.30)a. [Yoku(mo) koko ni kita] to omotta na!  
 YOKU(MO) here to came COMP thought PT  
 ‘(You) thought (I) did a good (bad) thing to come here!’
- b. [Yoku(mo) ore o damasita] to omotta na!  
 YOKU(MO) me ACC tricked COMP thought PT  
 ‘(I) thought you did a good (bad) thing to trick me.’

For these examples to be grammatical, we have to construe my thought as having had the form expressed by the sentential complement. In the case of quoted thoughts, standard semantic restrictions and interactions do not apply, as shown by many authors (see e.g. Schlenker 2003 for discussion). For this reason, the grammaticality of examples like these does not constitute a genuine counterexample to the generalizations made here. That these sentences are quotative can be verified by including indexicals in the complement, as in (6.31); *ore* is a masculine, low-register first person pronoun that sounds natural with *yoku(mo)*, both of which are low-register and tend to be associated with masculine or rough speech.

(6.31) Indexicals in complement:

- a. John-wa [ore-ga yoku(mo) koko ni kita] to omotta  
 John-TOP YOKU(MO) here to came COMP thought PT  
 na!

‘John thought he did a good (bad) thing to come here!’ NOT ‘John thought that I did a good (bad) thing ...’

- b. John-wa [yoku(mo) ore o damasita] to omotta na!  
 John-TOP YOKU(MO) me ACC tricked COMP thought PT  
 ‘John<sub>i</sub> thought (he) did a good (bad) thing to trick me<sub>i</sub>.’ NOT ‘John thought that (he) did a good (bad) thing to trick the speaker’

I should note that there may be additional restrictions (on, for instance, intentionality, agentivity, and disjunction), but speaker judgements are inconsistent, and so I do not consider these issues here.

**Conjunction:** Neither *yoku* nor *yokumo* can scope over a single conjunct of a conjunction, although they can apply to the entire conjunction in the case that it expresses a sequence of events that are connected in some coherent sense ((6.33); cf. Asher and Lascarides 2003 on coherence of discourse segments). Note that use of the adverbial is still bad if the conjunction can’t be interpreted in this way, for instance if the conjuncts involve different individuals and events as in (6.32).

- (6.32)a. \*yoku John-ga gohan tabete Mary-ga sake-o nonda  
 YOKU John-NOM food ate.GER Mary-NOM alcohol-ACC drank  
 na!  
 PT

‘It was good and surprising that John ate food and Mary drank alcohol.’

- b. \*yokumo John-ga gohan tabete Mary-ga sake-o  
 YOKUMO John-NOM food ate.GER Mary-NOM alcohol-ACC  
 nonda na!  
 drank PT

‘It was bad and shocking that John ate food and Mary drank alcohol.’

- (6.33)a. omae yoku sake non-de koko ni kita na!  
 you YOKU alcohol drink-CONJ here to came PT

‘You did a good thing by getting drunk and coming here, which is amazing to me.’

- b. omae yokumo sake non-de koko ni kita na!  
you YOKUMO alcohol drink-CONJ here to came PT  
‘You have a lot of guts to get drunk and come here.’

There are additional restrictions on possible discourse relations that can hold between the two clauses. They must be narrations (as in (6.33)). Examples involving causal relations between the clauses (e.g. connected with *kara* ‘because’, as in (6.34)) are not good, and neither are elaborations or backgrounding.

- (6.34)a. \* yoku omae-ga benkyoo sinakatta kara siken otita na!  
YOKU you-NOM study do-not-past because test fail-past PT  
‘You did a good thing by not studying and so failing the test.’

- (6.35)\* yokumo omae-ga benkyoo sinakatta kara siken  
YOKUMO you-NOM study do-not-past because test  
otita na!  
fail-past PT  
‘You did a good thing by not studying and so failing the test.’

### Disjunction

Neither *yoku* nor *yokumo* can scope over two propositions in a disjunction, just as in the cases of conjunction above. This is obvious in the case of sentential disjunctions, such as that in (6.36).

- (6.36)\* yokumo John-ga sara-o kowasita ka John-ga kabin-o  
YOKUMO John-NOM plate-ACC broke DISJ John-NOM vase-ACC  
kowasita na  
broke NA  
‘It was really bad that John broke a plate or John broke a vase.’

It also holds in the case of object NP disjunctions and VP disjunctions:

(6.37)\* yokumo John-ga sara ka gurasu-o kowasita na!  
 YOKUMO John-nom plate or glass-ACC broke PT

‘John really screwed up by breaking (that) glass or plate.’

(6.38)\* yokumo John-ga sara-o kowasita ka gurasu-o kowasita na  
 YOKUMO John-NOM plate-ACC broke DISJ glass-ACC broke NA

‘John really screwed up by breaking a plate or breaking a glass.’

Even disjunction of subjects is infelicitous.

(6.39)\* yokumo John ka Mary-ga sara-o kowasita na!  
 YOKUMO John or Mary-NOM plate-ACC broke PT

‘John or Mary really screwed up by breaking that plate.’

These facts, along with the facts about conjunction, suggest that a strengthening of the presupposition I proposed for *yoku(mo)* is in order: instead of assuming that the proposition the adverbial applies to just describes *some* event, it must describe a single event. I will follow most of the literature on events in assuming that the domain of events is structured into a lattice: given this, it is enough to say that the event that *yoku(mo)* applies to must be atomic. Adding this condition to the lexical entries for the adverbials gives the following formulas. These are nearly the final lexical entries I will propose for *yoku* and *yokumo*; below I will modify things a bit to reflect the analysis of emotional content proposed in the previous chapter.

- $\llbracket yoku \rrbracket = \lambda p \{ \exists e [\tau(e) = t \wedge t \leq n] \wedge Desc(e, p) \wedge Atom(e) \}. [p \wedge \mathbf{good}(p) \wedge \forall q \in C[(q \neq p) \rightarrow q >_{L_w} p]]$
- $\llbracket yokumo \rrbracket = \lambda p \{ \exists e [\tau(e) = t \wedge t \leq n] \wedge Desc(e, p) \wedge Atom(e) \}. [p \wedge \mathbf{bad}(s, p) \wedge \forall q \in C[(q \neq p) \rightarrow q >_{L_w} p]]$

For this to work, we need to assume a denotation for the conjoined event sequences which make up a single, larger, event something like that proposed by Barker (1992) for English group nouns. For Barker, group nouns are comprised of atoms, but are also atoms themselves. It seems reasonable to assume such a position for the conjoined events at issue.

### 6.1.5 Polarity switching

I would like to close the discussion of *yoku(mo)* with a discussion of the **bad/good** aspect of the adverbials' meaning. The meanings given for *yoku(mo)* can switch polarity in certain contexts; the positive meaning of *yoku* can become negative, as in (6.40a), and the negative attitude expressed by *yokumo* can become positive, as in (6.40b), repeated from (6.20).

- (6.40)a. omae yoku ano ii ko-o naguru ki-ni natta na  
 you YOKU that good kid-ACC hit feeling became PT  
 'I'm shocked at you for deciding to hit that kid.'
- b. omae yokumo konna ii sakuhin dekita n ya na  
 you YOKUMO this-kind-of good artwork was-able-to EMPH COP PT  
 'I can't believe you were able to make a piece this good!'

The positive/negative meanings of these expressions are probably best regarded as defaults which can be overridden by pragmatic information. For instance, the polarity switching of *yokumo* in (6.40b) presumably comes about because there is ordinarily nothing negative about being able to produce good artwork. Similar facts have been noted by Potts (2005) with respect to epithets.

In the previous chapter, I provided a way to model this kind of contextually dependent emotional meaning that involved use of a function  $E$  that maps propositions to speaker attitudes. It is simple to modify the semantics of *yoku(mo)* to incorporate this function; by doing this we automatically get a way to model the switching of polarity that is seen in examples like (6.40). The modification I have in mind simply switches **bad/good** in the lexical entries of the adverbials with the function  $E$ .

- $\llbracket yoku \rrbracket = \lambda p \{ \exists e [\tau(e) = t \wedge t \leq n] \wedge Desc(e, p) \wedge Atom(e) \} . [p \wedge E(c)(p)(p) \wedge \forall q \in C[(q \neq p) \rightarrow q >_{L_w} p]]$

- $\llbracket yokumo \rrbracket = \lambda p \{ \exists e [\tau(e) = t \wedge t \leq n] \wedge Desc(e, p) \wedge Atom(e) \} . [p \wedge E(c)(p)(s, p) \wedge \forall q \in C[(q \neq p) \rightarrow q >_{L_w} p]]$

### 6.1.6 Conclusions

I have shown in this section that *yoku(mo)* requires prior knowledge or a discourse particle to be felicitously used. When felicitous, it expresses a speaker attitude to the proposition it applies to, and states that it is unexpected. I modelled these facts in a dynamic semantics incorporating elements from SDRT. I further showed that *yoku(mo)* can apply only to propositions that describe events that have taken place in the actual world.

## 6.2 *Sekkaku*

The second adverbial I will consider in this chapter is *sekkaku*. Unlike *yoku(mo)*, *sekkaku* does not interact with sentence-final particles in any interesting way. I include it here because it has a distribution remarkably similar to that of *yoku(mo)*, suggesting some common elements to their meaning. As we will see, both adverbials can apply only to actual propositions. And, as we will also see, *sekkaku* is quite interesting in its own right: both in terms of its meaning, which is complex, and in its distribution. In particular, it has the peculiar property of not being able to modify matrix clauses.

Like *yoku(mo)*, the meaning of *sekkaku* is somewhat complicated and difficult to specify. First, several cases must be distinguished, as mentioned above; one in which *sekkaku* modifies a nominal, and one in which it serves as a propositional modifier. Examples of each were shown in (6.3), repeated here as (6.41); (6.41a) is an instance of propositional modification and (6.41b) exemplifies the nominal modification use. There is also a purely nominal use, shown in (6.41c): here, *sekkaku*

appears as a noun<sup>1</sup> and modifies a fact of some sort.

- (6.41)a. sekkaku tukutta noni tabenai no?  
SEKKAKU made even-though eat-not Q  
'Even though I made this on purpose for you, expending a lot of effort,  
you aren't going to eat it?'
- b. sekkaku-no umai sake dakara nomoo yo  
SEKKAKU-GEN tasty alcohol so drink-HORT PT  
'We've got this liquor that we're fortunate enough to have, so let's just  
drink it.'
- c. sekkaku dakara tabeyoo yo  
SEKKAKU so eat-HORT YO  
'It's made so let's eat it.'

I will concentrate on the sentence-modifying use of *sekkaku* here, because my intent is to bring out commonalities of distribution with *yoku(mo)*. The nominal modifier use I leave for another occasion, although it does seem to have a sentence-modifying quality in some uses at least. An analogy can be drawn here to the adjectival expletives discussed in a previous chapter.<sup>2</sup>

### 6.2.1 Meaning of *sekkaku*

The meaning of *sekkaku*, like that of *yoku(mo)*, is fairly complex. As we'll see, though, the components are in some respects similar. Both *sekkaku* and *yoku(mo)* have an emotional component: however, *sekkaku* always expresses a positive feeling toward the proposition it applies to, unlike *yoku(mo)*, which can switch polarity

---

<sup>1</sup>Apparently *sekkaku* was a nominal originally, and the adverbial use developed later (Eriko Atagi, p.c.).

<sup>2</sup>One can think of several ways to bring out these commonalities. The first is to use the *isolated conventional implicature* rule of Potts (2005); this will allow the nominal modifier to semantically modify the proposition denoted by the sentence, just as in Potts' analysis of expletives. Making this process optional also allows for a nominal modifying use. Another possibility is to use type-driven LF movement in conjunction with type-shifting. This approach sounds relatively unappealing given that we need both type-shifting and movement. In any case, I will not explore these options here.



in the right context. *Sekkaku* also does not express surprise at the truth of the proposition it applies to; rather, it expresses that the proposition holds as the result of intentional and direct action. Finally, we'll see that it expresses a notion of *expectation* about how courses of events should go. Each of these notions will be considered in more detail below.

A complication that immediately develops in thinking about the meaning of *sekkaku* is the fact that it cannot modify matrix clauses, but only subordinate or relative clauses. For instance, the examples in (6.42) are completely ungrammatical. I avoid glossing the adverbial for the moment. Note that both (6.42a) and (6.42b) are bad: this shows that the ungrammaticality here is not a result of a particular choice of syntactic ordering; also, the fact that versions of these sentences with nonhonorific verb forms and honorific forms are both ungrammatical shows that the badness here does not result from register (or agreement) mismatches.

- (6.42)a. \* sekkaku gohan-o tukutta/tukurimasita  
 SEKKAKU food-ACC made/made-HON  
 'I made food ...'
- b. \* gohan-o sekkaku tukutta/tukurimasita  
 food-ACC SEKKAKU made/made-HON
- c. \* sekkaku aruitekita  
 SEKKAKU walk-came  
 'I walked here ...'
- d. \* watasi-wa sekkaku Taro ni hon-o ageta  
 I-TOP SEKKAKU Taro to book-ACC gave  
 'I gave Taro a book ...'

In order for to be used felicitously, *sekkaku* must appear in a subordinate or relative clause. I will return to the relative clauses later in the chapter when I try to show why *sekkaku* is disallowed in matrix clauses; for the present discussion, which focuses on the adverbial's meaning, I will restrict myself to subordinate clauses. Koyano (1997) performs a corpus study of the distribution of *sekkaku*, find-

ing that by far the most common connective (subordinator) used with it is *noni* ‘even though’, followed by *no dakara* ‘because’ and *sitemo*, a kind of concessive conditional translatable as ‘even if/even though’. Examples of each of these forms follow.

- (6.43)a. sekkaku gohan tukutta noni tabenai no?  
 SEKKAKU food made NONI eat-not Q  
 ‘Even though I went to the trouble of making this food . . . , aren’t you going to eat it?’
- b. sekkaku gohan tukutta (no da) kara tabete yo?  
 SEKKAKU food made (NO COP) because eat-IMP YO  
 ‘Because I went to the trouble of making this food . . . , eat some man!’
- c. sekkaku gohan tukut-temo tabete-kure-nakatta  
 SEKKAKU food made-CONCESS eat-receive-not-PST  
 ‘Even though I went to the trouble of making food . . . , (he) didn’t eat any.’

Because of the need of *sekkaku* to appear with subordinators, it can be difficult to separate the semantic contribution of the adverbial from those of the subordinators themselves. For instance, many native speakers I consulted commented that *sekkaku*( $\varphi$ ) indicates that  $\varphi$  did not happen. But this is not correct, as can be seen clearly from the gloss of (6.43c) above. The intuition that *sekkaku*( $\varphi$ )  $\models \neg\varphi$  clearly is a result of the frequency with which *sekkaku* appears with *noni*, which does support this inference. As a way to guard against these kinds of errors, I will adopt as a methodological strategy using at least two examples when working out the meaning contribution of *sekkaku*, one with *noni* and one with *kara*, which have very different semantic profiles. I will now move on to work out the meaning of this adverbial.

Consider two typical examples of *sekkaku*, in (6.44) and (6.45). This time I will gloss the adverbial meaning.

(6.44) *sekkaku gohan tukutta noni (tabenai no?)*  
 SEKKAKU food made NONI (eat-not Q)  
 ‘Even though I went to the trouble of making this food, which was a good thing  
 (aren’t you going to eat it?)’

(6.45) *sekkaku gohan tukutta (no da) kara tabete yo*  
 SEKKAKU food made (NO COP) because eat-IMP YO  
 ‘Because I went to the trouble of making this food, eat some man!’

As these glosses suggest, the meaning of *sekkaku* has several parts. First, it suggests that the speaker believes that the proposition *sekkaku* applies to is in some way positive for the hearer. One would not use *sekkaku* in instances when this positivity is not present, as in (6.46).

(6.46)? *sekkaku asi-o otta kara yasume yo*  
 SEKKAKU leg-ACC broke because rest-IMP YO  
 ‘Since you went to the trouble of/were lucky enough to break your leg, have a rest.’

This part of *sekkaku*’s meaning can be formalized using the predicate **good**; there is no need here to use the function to emotional states *E*, in that *sekkaku* never has a negative quality.

- $\llbracket \textit{sekkaku} \rrbracket = \lambda p. [p \wedge \mathbf{good}(p)]$

A persistent intuition about *sekkaku* is that it applies to events that have agents, and that the agent performed the action of the event on purpose, i.e. intentionally: this is reflected in the glosses above with the use of *take the trouble to . . .*. One might build this into the semantics of the adverbial using a presupposition, as follows.

- $\llbracket \textit{sekkaku} \rrbracket = \lambda p \{ p(e) \wedge \exists x [ \textit{Agent}(x, e) \wedge \textit{Intend}(x, \textit{realize}(e)) ] \}. [p \wedge \mathbf{good}(p)]$

This, however, is too strong. The reason is that *sekkaku* can apply to sentences that lack agents altogether, as in the following example.

(6.47)sekkaku kuri-ga otita kara hiroo yo  
 SEKKAKU chestnuts-NOM fallen-down because pick.up-HORT YO

‘Since fortunately some chestnuts have fallen down here let’s pick them up.’

However, if the eventuality denoted by a given sentence *does* have an agent, the sense of intentionality is always present. To incorporate this fact into the semantics is straightforward: we can use a conditional statement that is a variant of the presupposition above. By doing this, we introduce a statement about intentionality just in case an agent is present.<sup>3</sup>

- $\llbracket \textit{sekkaku} \rrbracket = \lambda p.[p \wedge \textit{good}(p) \wedge \forall e \forall x [\textit{Desc}(p, e) \wedge \textit{Agent}(x, e) \rightarrow \textit{Intend}(x, \textit{realize}(e))]]$

I should note that the event argument, *e*, in these formulas is not intended to be restricted to sentences that denote events—accomplishments, activities, and achievements (Vendler, 1967; Smith, 1997)—as opposed to states. *Sekkaku* can be used with stative sentences without problems.

(6.48)sekkaku osake katta-aru kara nomoo yo  
 SEKKAKU alcohol buy-STAT because drink-HORT YO

‘We’re lucky enough to have some alcohol, so let’s drink!’ (lit. ‘We’re lucky enough to be in a state of having alcohol bought, so ...’)

At this point we have captured two aspects of the meaning of *sekkaku*: the speaker’s positive attitude toward the proposition it modifies, and the imputation of intentionality to the agent of the event described, if the event in fact has an agent. But this does not exhaust the issues involved in the description of *sekkaku*. First, of course, we have not accounted for its appearance exclusively in subordinate clauses. I will take this point up in the last section of the chapter as it requires a fair amount of discussion. In fact, however, there are still issues in the meaning of *sekkaku* that have not been covered. Specifically, *sekkaku* turns out to have a modal flavor.

---

<sup>3</sup>Uniqueness of  $\theta$ -roles will guarantee that we do not get untoward results from using universal quantification here.

Consider again the examples in (6.43), repeated here in part as (6.49). Here I have filled in the ellipses in the glosses with statements with *should*. The intuition here is that the speaker believes, not only that the proposition to which *sekkaku* applies is good or lucky, but also that it is associated with some other action that should have been done in response to the event. Thus, in (6.49), in each case the speaker expresses a belief that, since food was made, it should have been eaten; in (6.47) a belief that since chestnuts have fallen, they should be collected, in (6.48) that since there is alcohol, it should be drunk, and so on.

- (6.49)a. sekkaku gohan tukutta (no da) kara tabete yo  
 SEKKAKU food made (NO COP) because eat-IMP YO  
 ‘Because I went to the trouble of making this food, a good thing which you should act on, eat some man!’
- b. sekkaku gohan tukut-temo tabete-kure-nakatta  
 SEKKAKU food made-CONCESS eat-receive-not-PST  
 ‘Even though I went to the trouble of making food, a good thing which should have been acted on, (he) didn’t eat any.’

An immediate worry that arises here is that the matrix clauses often express exactly those assessments; for instance, in (6.49a) the speaker explicitly asks the hearer to eat the food. But this is not the case in (6.49b), in which it is asserted that nothing was eaten; here, *sekkaku* nonetheless retains its modal flavor (and thus a feeling of disapprobation), showing that it is the adverbial itself that introduces this modal statement, not something (here probably a Gricean implicature from the use of the imperative, or possibly a presupposition of it) associated with the matrix.

How should the modal flavor of *sekkaku* be characterized? The right kind of statement seems to be a conditional: given  $\varphi$  (the argument of *sekkaku*), it should be the case that  $\psi$ . Since this is a belief of the speaker, it can be inserted directly into the lexical entry for *sekkaku*.

(6.50)  $\varphi \rightarrow \textit{should}\psi$

We now have a semantics for *should* that allows an interpretation for the formula in (6.50). I will now simply incorporate this formula into our existing semantics, yielding the following lexical entry.

- $\llbracket sekkaku \rrbracket = \lambda p. [p \wedge \mathbf{good}(p) \wedge \forall e \forall x [Desc(p, e) \wedge Agent(x, e) \rightarrow Intend(x, realize(e))] \wedge \exists q [\forall p \rightarrow should(q)]]$

It is not obvious how to set the identity of *q* in this formula. It seems that it comes from world knowledge: if food is made, one should eat it; if chestnuts are on the ground, one should gather them; if there is beer to drink, one should drink it. My guess is that the identity of *q* is in general drawn from scripts or knowledge about typical sequences of actions; one might make use of SDRT-style axioms here, incorporating them into lexical knowledge in a way similar to that of Asher and Pustejovsky (2004) and ultimately implicit in the Generative Lexicon program in general (Pustejovsky, 1995). I will not make how this idea works out explicit here.

### 6.2.2 Denials

Denials with *sekkaku* work more simply than denials with *yoku(mo)*. Even the strictly truth-functional *uso* ‘lie’ is felicitous; but only certain parts of the *sekkaku* content can be denied successfully. Still, the facts are much simpler than the *yoku(mo)* case, and, as I will show, there is no need to postulate a complex discourse structure for the adverbial content.

(6.51) *sekkaku keeki-o tukutta noni ...*  
 SEKKAKU cake-ACC made NONI ...  
 ‘Even though I made a cake special ...’

(6.52)a. *Uso!*  
 Lie  
 ‘False!’

b. *tigau yo*  
 wrong YO

‘That’s not right!’

- c. sonna koto nai yo  
that.kind.of thing COP.NEG YO  
‘That’s not the right characterization!’

Any of these denials can mean that it’s not the case that the cake was made on purpose, or that no cake was made; but they *cannot* mean that e.g. making the cake was not a good thing, or that there is nothing that should result from making a cake. It is easy to see why the **goodness** of the cake-making is not deniable; the reason is just the same as for the *yoku(mo)* cases; individuals have privileged access to their own mental states, so it does not make sense for others to deny their feelings about particular things.<sup>4</sup> But we need to do a little work to ensure that the rest of the denials work out correctly.

The fact that the conditional ( $\forall p \rightarrow should(q)$ ) cannot be denied suggests that it is, in fact, not part of the *asserted* content of the adverbial at all, but rather is presupposed. It is not easy to determine whether it passes the other presupposition tests, given the restrictions on *sekkaku*’s distribution to be discussed in the next section—it cannot modify modalized sentences or conditionals—but its behavior under the negation from denials indicates that it is not asserted at all. Thus I will reanalyze it as a presupposition. A simple modification to the lexical entry for *sekkaku* serves to make this work out.

- $[[sekkaku]] = \lambda p \{ \exists q [ \forall p \rightarrow should(q) ] \} . [ p \wedge \mathbf{good}(p) \wedge \forall e \forall x [ Desc(p, e) \wedge Agent(x, e) \rightarrow Intend(x, realize(e)) ] ]$

Given this lexical entry, it is clear why the truth of *p* or *p*’s intentional nature can be denied; they are both asserted. However, the relation between *p* and another proposition *q* cannot be denied, for it is presupposed. Since *sekkaku* does not exhibit

---

<sup>4</sup>Of course, if an interlocutor has independent evidence for the speaker’s feelings, he probably can make a felicitous denial; for instance, if the speaker had previously expressed that she didn’t think that making the cake was good in any way. We can safely ignore this case, however, when setting up the basic semantics.

the complex interaction with denial found with *yoku(mo)*, we have no need to make use of SDRT notions of discourse structure here.

### 6.2.3 Distribution of *sekkaku*

The distribution of *sekkaku*, interestingly, is very like that of *yoku(mo)*. Just as with *yoku(mo)*, *sekkaku* is bad (on any scoping) with modals, in conditional constructions, and in sentences describing (non-settled) future events; also like *yoku(mo)*, it can be used with negation only if a coerced reading of the negative sentence is available. I conclude that *sekkaku* also may apply only to actual propositions.

#### Modals:

*Sekkaku* cannot appear in modalized sentence, whether they describe future (6.53a) or past (6.53b) possibilities. Just as with *yoku(mo)*, neither the  $Adv(\diamond\varphi)$  order nor the  $\diamond(Adv(\varphi))$  scoping is available in these sentences.

- (6.53)a. \* ashita mochi-o sekkaku tsukuru kamoshirenai kara  
tomorrow ricecake-ACC SEKKAKU make might because  
kite yo  
come-IMP YO  
‘Tomorrow I might go to the trouble of making a ricecake, so come over.’
- b. \* kinoo mochi-o sekkaku tsukutta kamoshirenai kara kite  
yesterday ricecake-ACC SEKKAKU made might kara kite  
yo  
yo  
‘Yesterday I might have gone to the trouble of making a ricecake so come over.’

#### Conditionals:

Again like *yoku(mo)*, *sekkaku* cannot appear in the antecedent or consequent



of conditionals, and also may not apply to the entire conditional proposition. Similar facts obtain with examples that use *to* or *-ba* conditionals rather than *-tara* conditionals, as shown by 6.55) and 6.56).<sup>5</sup>

- (6.54)a. \* [omae-ga sekkaku keeki-o tukuttara] mochiron taberu yo  
 you-NOM SEKKAKU cake-ACC make-COND of-course eat YO  
 ‘If you go to the trouble of making a cake, of course I’ll eat it.’
- b. \* taberu no dattara [sekkaku gohan-o tukuru yo]  
 eat NO COP-COND SEKKAKU food-ACC make YO  
 ‘If you’ll eat it, I’ll go to the trouble of making some food.’
- c. \* sekkaku [omae-ga cake-o tukuttara] mochiron taberu yo  
 SEKKAKU you-NOM cake-ACC make-COND of-course eat YO
- (6.55)a. \* [omae-ga sekkaku keeki-o tukuru to] mochiron taberu yo  
 you-NOM SEKKAKU cake-ACC make COND of-course eat YO  
 ‘If you go to the trouble of making a cake, of course I’ll eat it.’
- b. \* taberu no da to [sekkaku gohan-o tukuru yo]  
 eat NO COP COND SEKKAKU food-ACC make YO  
 ‘If you’ll eat it, I’ll go to the trouble of making some food.’
- c. \* sekkaku [omae-ga cake-o tukuru to ] mochiron  
 SEKKAKU you-NOM cake-ACC make COND of-course eat  
 taberu yo  
 YO
- (6.56)a. \* [omae-ga sekkaku keeki-o tukureba] mochiron taberu yo  
 you-NOM SEKKAKU cake-ACC make-COND of-course eat YO  
 ‘If you go to the trouble of making a cake, of course I’ll eat it.’
- b. \* taberu no deareba [sekkaku gohan-o tukuru yo]  
 eat NO COP-COND SEKKAKU food-ACC make YO  
 ‘If you’ll eat it, I’ll go to the trouble of making some food.’
- c. \* sekkaku [omae-ga cake-o tukureba] mochiron taberu yo  
 SEKKAKU you-NOM cake-ACC make-COND of-course eat YO

---

<sup>5</sup>The construction *no da* will be explained immediately below.

However, these conditionals all become felicitous when the sentence-final element *no da*<sup>6</sup> is inserted in the conditional antecedent (along with *sekkaku* itself). This doesn't work in the consequent though. I show the *-tara* case.

- (6.57)a. [omae-ga sekkaku keeki-o tukuru no dattara] mochiron  
 you-NOM SEKKAKU cake-ACC make NO COP-COND of-course  
 taberu yo  
 eat YO  
 'If you're going to go to the trouble of making a cake, of course I'll eat it.'
- b. \* taberu no deareba [sekkaku gohan-o tukuru yo]  
 eat NO COP-COND SEKKAKU food-ACC make YO  
 'If you'll eat it, I'll go to the trouble of making some food.'

It has been stated in traditional grammar that the function of *no da* is to emphasize the sentence before it. Hiraiwa and Ishikawa (2002) reconsider this intuition, analyzing *no da* as an instance of a cleft construction. I think *no da* is actually somewhat more complicated than this,<sup>7</sup> but for our purposes this idea will be enough. One thing that clefts do is presuppose whatever is clefted: the existence of some individual in the case of clefted nominals like (6.2.3).

(6.58) Who came to the party was John. (presupposes  $\exists x[CP(x)]$ )

So, if *no da* is indeed a cleft, then the truth of the sentence that is its complement is presupposed. The reason for these facts seems again to be just that *sekkaku* selects for what I have called actual propositions; since a presupposed proposition must be actual, the selection requirements of *sekkaku* are satisfied by using *no da*. This idea also clarifies why using *no da*, along with *sekkaku*, in the conditional antecedent doesn't save the sentence: the truth of the consequent cannot be presupposed, or the utterance of the conditional is infelicitous for Gricean reasons, meaning that what is presupposed must be the entire sentence, which is still interpreted conditionally, and thus non-actually.

<sup>6</sup>*No da* is also often shortened to *n da* or, in some dialects, just *n*. I'll use the long form though.

<sup>7</sup>See e.g. Noda (1997) for discussion.

One interesting thing here is that adding *no da* doesn't do any good in conditional sentences with *yoku(mo)*:

- (6.59)a. \*Yokumo koko ni kuru no dattara, shachoo ga okoru daroo  
 YOKUMO here to come NO COP-if, boss NOM get-angry probably  
 'If you have a lot of guts to come here, the boss will probably get angry.'
- b. \*Taro ga sake o nomitai no dattara, yokumo koko ni  
 Taro NOM alcohol ACC drink-want NO COP-if, YOKUMO here to  
 kuru daroo  
 come probably  
 'If Taro wants to drink, he will probably have a lot of guts to come here.'

These sentences are still absolutely terrible.<sup>8</sup> I don't at present know why this difference between *sekkaku* and *yoku(mo)* exists; clearly, the conditions on *yoku(mo)* are stricter than those on *sekkaku*, but why this is remains mysterious. I leave this problem for future work.

### **Futurates:**

I showed above that *yoku(mo)* is infelicitous with futurate sentences that cannot be coerced to descriptions of actual propositions, such as statements of decisions already made about future plans. It turns out that *sekkaku* is even stricter; even if a sentence is construed as describing past decisions, futurate sentences remain infelicitous.

- (6.60)a. \*ashita mochi-o sekkaku tsukuru kara kite yo  
 tomorrow ricecake-ACC SEKKAKU make because come-IMP YO  
 'Tomorrow I will go to the trouble of making a ricecake so come over.'
- b. \*raishuu sekkaku nomiya ni iku noni nomazuni kaeru  
 next-week SEKKAKU bar to go although drink-without go-home

---

<sup>8</sup>All my informants literally burst out laughing when presented with them. The consensus was that they are completely ridiculous.

‘Next week although we’ll go to the trouble of going to a bar we’ll go home without drinking.’

**Negation:**

Using *sekkaku* in negated sentences is not so good either.

- (6.61)a. ? sekkaku gohan-o tsukuranakatta kara taberu mono nai (yo)  
SEKKAKU food-ACC make-not-PST (YO)  
‘I went to the trouble of not making any food so there’s nothing to eat.’
- b. ? sekkaku kurabu-ni ikanakatta noni nerarenakatta  
SEKKAKU club-to go-not-PST NONI sleep-can-neg-pst  
‘Even though I went to the trouble of not going to the club, I couldn’t sleep.’

However, sentences like this are not totally out. Just as in the *yoku(mo)* case, interpreting the sentence as a negative description of some action (e.g. choosing not to make any food in (6.61a) or to go to the club in (6.61b)). These sentences are both improved by the addition of sentence-final *noni* ‘even though’. This is probably due to the nature of *sekkaku*: as its semantics involve the intentions of the subject, marking a conflict with those intentions using *noni* generally improves *sekkaku* sentences.

**Attitudes:**

As with *yoku(mo)*, *sekkaku* is not too good in true attitudes such as *believe*.

- (6.62)a. \* biiru-o sekkaku kau to sinjita  
beer-ACC SEKKAKU buy COMP believe-PST  
‘I believed you would purposely and fortunately buy beer.’
- b. \* sekkaku kita to sinjita (noni)  
SEKKAKU came COMP believed (even though)  
‘(Even though) I believed you purposely and fortunately came.’

The reason for this is presumably just the same as that for *yoku(mo)*—a need for actual propositions.

### Quotatives:

Again, the facts here are the same as those for *yoku(mo)*: *sekkaku* can be used in attitude complements if they can be understood as quotative.

- (6.63)a. [sekkaku koko ni kita] to omotta  
SEKKAKU here to came COMP thought  
'(You) thought (I) came here purposely and fortunately.'
- b. [sekkaku pan o yaita] to omotta  
SEKKAKU bread ACC roasted COMP thought  
'(I) thought you purposely and fortunately made bread.'

Again, the reason behind this is just the same as that for *yoku(mo)*; since the quoted utterances were originally free-standing, they may at that time have described actual propositions.

### Conjunction and Disjunction:

Applying *sekkaku* to conjunctions and disjunctions seems to be fine, unlike the case of *yoku(mo)*. Conjunction with distinct subjects is fine, and other conjunctions are as well.

(6.64) Conjunction:

- a. sekkaku John-ga gohan tabete Mary-ga sake-o nonda  
SEKKAKU John-NOM food ate.GER Mary-NOM alcohol-ACC drank  
noni ...  
even though ...

‘Even though it was good and intentional and ... that John ate food and Mary drank alcohol ...’

(6.65) Disjunctions:

a. Sentential disjunction:

sekkaku John-ga sara-o tsukutta ka John-ga kabin-o  
SEKKAKU John-NOM plate-ACC made DISJ John-NOM vase-ACC  
tsukutta noni ...  
made even though ...

‘Even though it was good and ... that John made a plate or John made a vase, ...’

b. Object disjunction:

sekkaku John-ga sara ka gurasu-o tukutta noni ...  
SEKKAKU John-nom plate or glass-ACC made even though ...

‘Even though John’s making (that) glass or plate was ...’

c. sekkaku John ka Mary-ga sara-o tukutta noni ...  
SEKKAKU John or Mary-NOM plate-ACC made even though ...

‘Even though John or Mary really did something nice and ... in making that plate ...’

These facts indicate that *sekkaku* should be associated with a presupposition of the same sort assigned to *yoku(mo)*; the two differ only in that *sekkaku* doesn’t need to apply to atomic events. Thus we need only remove the clause *Atom(e)* from the presupposition of *yoku(mo)*. Adding the remaining formula as a presupposition of *sekkaku* leaves us with the following lexical entry.

- Final semantics for *sekkaku*:  $\llbracket sekkaku \rrbracket = \lambda p. \{ \exists q [ \forall p \rightarrow should(q) ] \wedge \exists e [ \tau(e) = t \wedge t \leq n ] \wedge Desc(e, p) \} [ p \wedge \mathbf{good}(p) \wedge \forall e \forall x [ Desc(p, e) \wedge Agent(x, e) \rightarrow Intend(x, realize(e)) ] ]$

## 6.2.4 Explaining antirootedness

Now I want to return to the question raised at the beginning of the discussion of *sekkaku*: why is it impossible for it to modify root clauses? I will explore two

approaches to this question after looking at some additional data, beginning with a syntactic approach and then trying out a semantic one. In the end, I will be unable to give a definitive account of the facts, and will have to settle for sketching an idea that might, if properly worked out, be able to serve as the basis for a more comprehensive theory.

Let's first take a more detailed look at exactly what sorts of subordinate clauses *sekkaku* appears in. According to the corpus study of Koyano (1997), the primary locii of *sekkaku* are subordinate clauses headed by the following forms, which I number for convenience in the following discussion. The final column shows the number of occurrences of these forms, out of a total number of 458 in the corpus search:

	Form	Meaning	
1	noni	even though	100
2	-temo	concessive; cf. even if	25
3	-te	conjunctive	11
4	no dakara	NO because	62
5	no dakara to	NO because Comp	8
6	no da	NO COP	6

Some of these constructions have already been discussed in some detail, notably 1, 2, 4, and 6, all of which are presuppositional in nature—that is, each presupposes the content of its clausal complement. Of the remaining types, 5 is simply a variant of 4 which appears as the complement of a quotative or attitude verb; this is presuppositional due to the presence of (a) the *no da* construction discussed previously, and (b) the *because*-clause. So a first hypothesis about the data is that *sekkaku* is restricted to clauses whose content is presupposed; it will be (generally) blocked in matrix clauses because their content is asserted, not presupposed (ex-

cluding the complements of certain attitude verbs). To see if this idea is correct, let us check the remaining constructions. I have not looked yet at the construction in 3,<sup>9</sup> so let's consider it now briefly, with an eye to whether its content is presupposed.

A basic instance of this construction is shown in (6.66).

- (6.66) wain-o    nonde    sakana-o tabeta  
 wine-ACC drink-TE fish-ACC ate  
 '(I) drank wine and ate fish (or 'drank wine then ate fish').'

To see whether this content is presupposed, let's consider how it interacts with negation. There are two ways to negate sentences like these, just as in English; use of a 'sentence-internal' negation and a negating exterior clause. I show both here.

- (6.67)a. wain-o    nonde    sakana-o tabe-nakat-ta  
 wine-ACC drink-TE fish-ACC eat-neg-pst  
 '(I) drank wine and didn't eat fish (or 'drank wine then didn't eat fish').'
- b. wain-o    nonde    sakana-o tabeta no    janai  
 wine-ACC drink-TE fish-ACC ate    NOM COP-NEG  
 '(I) didn't drink wine and eat fish (or 'drink wine then eat fish').'

Since the sentential negation in (6.67b) can scope over the content of the first clause, clauses headed by *-te* clearly do not presuppose their content. This rules out the hypothesis about presupposition.

And in fact this hypothesis should be ruled out for other reasons. As I mentioned at the beginning of this section, *sekkaku* can also modify relative clauses, even when they appear in the matrix clause.<sup>10</sup> I do not represent the whole meaning

<sup>9</sup>Although I have touched on it in a sense, in that the discourse particle *sosite* which was shown to (partially) license modal subordination in chapter 3 is, diachronically speaking, a development from the propositional anaphor *soo* combined with the light verb *suru* in this form: *soo+(suru+te=site→sosite*.

<sup>10</sup>The complex predicate *otositesimatta* in (6.68a) consists of three parts: *otosu* 'to drop', *simau* 'to have completed/to unfortunately have done' and the past tense morpheme. I gloss *simau* as a simple perfective marker, putting aside a number of complex issues (e.g. adversativity) in its meaning.



of *sekkaku* in the glosses.

- (6.68)a. sekkaku tukutta keeki-o otositesimatta  
SEKKAKU make-pst cake-ACC drop-PRF-PST  
'I screwed up and dropped the cake I made on purpose, etc.'
- b. Taroo-ga sekkaku kane-o zenbu tukatte katta  
Taro-NOM SEKKAKU money-ACC all use-CONJ bought  
rekoodo-o nakusita  
record-ACC lost  
'Taro lost the record he, on purpose etc., spent all his money on buying.'

As should be clear from the glosses, *sekkaku* modifies the content of the relative clause, not the matrix. These examples are fine, yet there is clearly no presupposition associated with the relative clause.

The upshot of this discussion is that the restrictions on *sekkaku* have nothing to do with presupposition, and, probably, little to do with the kind of subordinator that heads the subordinate clause (except, of course, when a particular head forces a nonactual interpretation on its clausal complement, in which case use of *sekkaku* is disallowed; conditionals instantiate this case). Thus we are left with the conclusion that, simply enough, something in the syntax or semantics of matrix clauses themselves is either incompatible with *sekkaku*, or leaves something out that *sekkaku* requires. To see what this might be, we must determine what is present in matrix clauses that does not appear in subordinate or relative clauses. A natural possibility is that it is a kind of speech act operator, probably one indicating a speech act type. For our examples this would be an assertion operator.

Operators that indicate speech acts, such as assertion operators, apply only at the final point of semantic computation. For this reason, they take scope over the entire sentence, and apply directly to the result of composing its semantic denotation; that is, they must take widest scope. Subordinate clauses and relative clauses are not ordinarily assumed to be associated with speech acts distinct from those of

the main clause.<sup>11</sup> If this is correct (see e.g. Krifka 2001 for discussion), assertive operators apply (directly) only to the matrix clause.

Clearly, the incompatibility of *sekkaku* and speech act operators cannot be directly semantic, for the content of relative and subordinate clauses is asserted just as much as the content of matrix clauses. Most likely there is something syntactic going on here. My assumption is that *sekkaku* simply cannot coexist with the speech act operator; I do not at present know just why this should be, however. I will leave the details of this question for future research, here simply laying out a possible implementation of the idea. I propose that the speech act operator is contained in a maximal projection with widest scope over the sentence; a natural choice is the SpeechActP of Cinque (1999), although other options are of course available. This maximal projection contains an assertion operator *A* that, following Krifka (1992), I take to existentially close the event argument of the sentence denotation. *Sekkaku* can then be assumed to be incompatible with this operator in the sense that it may not appear in the syntax at the same ‘level.’ The idea would be that relative and subordinate clauses contain some sort of barrier, perhaps a CP boundary, that somehow blunts the force of the assertion operator and allows *sekkaku* to appear. This idea does account for the descriptive facts. Such an analysis, however, is rather stipulative and inelegant, and, worse, in no way explains *why* this should be true. For this reason, I cannot at present endorse it completely, and will refrain from working it out any further.

I close with another (wild) possibility. We have seen that a number of Japanese expressions are dependent on discourse structure for licensing: modal subordination, certain interpretations of *yo* and *zo*, the semantic content of *yoku(mo)*.

---

<sup>11</sup>This assumption is challenged, however, by theories like SDRT, in which subordinate clauses are assumed to introduce speech acts which are attached by discourse relations to the speech act of the main clause. For present purposes I will abstract away from this distinction; at some point, however, it would be necessary to reconcile the assumptions of SDRT, which I assume elsewhere in this work, with the assumption I make here about speech act operators, should this analysis be adopted.

And, as we have also seen, *sekkaku* contains in its semantics an unexpressed proposition that stands in a complex relation to the one *sekkaku* modifies. Now, another way of thinking about *sekkaku*'s distribution is, not just that it cannot appear in a matrix clause, but that it *requires* content besides what it modifies, and that the only way to guarantee the presence of this content is for it to appear outside matrix clauses (in that one can always have only a matrix clause, but not (semantically) only a subordinate or relative clause). It now seems reasonable to hypothesize that the reason *sekkaku* must have a matrix clause is that it needs a way to compute the unexpressed proposition in its semantics; perhaps the matrix clause is there to provide clues for inferring what the content of this proposition should be.

I do not at present know whether this idea is right, but intuitively it seems to be on the right track. I cannot attempt a detailed exploration of this question here, and so leave it for the future.

# Bibliography

- Anand, Pranav and Andrew Nevins. 2004. Shifty operators in changing contexts. In *Proceedings of SALT XIV*.
- Asher, Nicholas. 1987. A typology for attitude verbs and their anaphoric properties. *Linguistics and Philosophy* 10:125–198.
- Asher, Nicholas. 1993. *Reference to Abstract Objects in Discourse*. Dordrecht, Reidl: Kluwer.
- Asher, Nicholas. 2000. Truth conditional discourse semantics for parentheticals. *Journal of Semantics* 17:31–50.
- Asher, Nicholas and Thony Gillies. 2003. Common ground, corrections and coordination. *Argumentation* 17(4):481–512.
- Asher, Nicholas and Alex Lascarides. 2001. Indirect speech acts. *Synthese* 128:183–228.
- Asher, Nicholas and Alex Lascarides. 2003. *Logics of Conversation*. Cambridge University Press.
- Asher, Nicholas and Eric McCready. 2004. Were, would, must and a compositional account of counterfactuals. Paper presented at the 2004 Meeting of the Society for Exact Philosophy; expanded version submitted.

- Asher, Nicholas and Michael Morreau. 1991. Commonsense entailment: a modal theory of nonmonotonic reasoning. In J. Mylopoulos and R. Reiter, eds., *Proceedings of the Twelfth International Joint Conference on Artificial Intelligence*, pages 387–392. Los Altos, California: Morgan Kaufman.
- Asher, Nicholas and James Pustejovsky. 2004. The metaphysics of words in context. Ms., UT-Austin and Brandeis University.
- Asher, Nicholas and Linton Wang. 2003. Unspecification, ambiguity and anaphora with plurals. In *Proceedings of Semantics and Linguistic Theory 13*.
- Barker, Chris. 1992. Group terms in English: Representing groups as atoms. *Journal of Semantics* 9:69–93.
- Barker, Chris. 2002. The dynamics of vagueness. *Linguistics and Philosophy* 25:1–26.
- Bartels, Christine. 1997. *The Intonation of English Statements and Questions: a Compositional Interpretation*. Ph.D. thesis, University of Massachusetts at Amherst.
- Beaver, David. 2002. *Presupposition and Assertion in Dynamic Semantics*. No. 16 in Studies in Logic, Language and Information. Stanford, CA: CSLI/FoLLI.
- Beck, Sigrid, Toshiko Oda, and Koji Sugisaki. 2004. Parametric variation in the semantics of comparison: Japanese vs. English. *Journal of East Asian Linguistics* 13:289–344.
- Blackburn, Patrick, Maarten de Rijke, and Yde Venema. 2001. *Modal Logic*. No. 53 in Cambridge Tracts in Theoretical Computer Science. Cambridge University Press.

- Bos, Johan. 1995. Predicate logic unplugged. In *Proceedings of the 13th Amsterdam Colloquium*, pages 133–143.
- Chierchia, Gennaro. 1995. *Dynamics of Meaning*. University of Chicago Press.
- Chierchia, Gennaro. 1998. Reference to kinds across language. *Natural Language Semantics* 6:339–405.
- Cinque, Guglielmo. 1999. *Adverbs and Functional Heads: a Cross-Linguistic Perspective*. Oxford University Press.
- Condoravdi, Cleo. 2002. Temporal interpretation of modals. In D. Beaver, L. Casillas Martinez, B. Clark, and S. Kaufmann, eds., *The Construction of Meaning*. Stanford: CSLI Publications.
- Condoravdi, Cleo. 2003. Moods and modalities for “will” and “would”. Handout for talk given at the 14th Amsterdam Colloquium.
- Corblin, Francis. 1994. L’anaphore en subordination modale. In *Actes du colloque d’Anvers: Relations anaphoriques et (in)cohérence*. CNRS Rennes.
- Dalrymple, Mary. 2001. *Lexical-Functional Grammar*. New York: Academic Press.
- Dayal, Veneeta. 1999. Bare NPs, reference to kinds, and incorporation. In *Proceedings of SALT IX*.
- de Swart, Henriette. 1998. Aspect shift and coercion. *Natural Language and Linguistic Theory* 16:347–85.
- Dever, Josh. 2001. Complex demonstratives. *Linguistics and Philosophy* 24:271–330.
- Elbourne, Paul. 2001. E-type anaphora as NP-deletion. *Natural Language Semantics* 9:241–288.
- Enc, Murvet. 1987. Anchoring conditions for tense. *Linguistic Inquiry* 18:633–657.

- Faller, Martina. 2002. *Semantics and Pragmatics of Evidentials in Cuzco Quechua*. Ph.D. thesis, Stanford University.
- Fernando, Tim. 1993. Generalized quantifiers as second-order programs—‘dynamically’ speaking, naturally. In *Proceedings of the Ninth Amsterdam Colloquium*.
- Fine, Kit. 1975. Vagueness, truth, and logic. *Synthese* 30:265–300.
- Frank, Anette. 1997. *Context Dependence in Modal Constructions*. Ph.D. thesis, University of Stuttgart.
- Frank, Anette and Hans Kamp. 1997. On context dependence in modal constructions. In *SALT VII*.
- Gardenfors, Peter. 1988. *Knowledge in Flux*. MIT Press.
- Geurts, Bart. 1995. *Presupposing*. Ph.D. thesis, University of Stuttgart.
- Geurts, Bart. 1999. *Presupposition and Pronouns*. Oxford: Elsevier.
- Gillies, Thony. 2004. Epistemic conditionals and conditional epistemics. *Nôus* 38:585–616.
- Groenendijk, Jeroen and Martin Stokhof. 1991. Dynamic predicate logic. *Linguistics and Philosophy* 14:39–100.
- Groenendijk, Jeroen and Martin Stokhof. 1997. Questions. In *Handbook of Logic and Language*. Elsevier.
- Groenendijk, Jeroen, Martin Stokhof, and Frank Veltman. 1996. Coreference and modality. In S. Lappin, ed., *Handbook of Contemporary Semantic Theory*. Blackwell.
- Guerzoni, Elena. 2003. *Why Even Ask?*. Ph.D. thesis, MIT. Draft of July 2003.

- Gunlogson, Christine. 2003. *True to Form: Rising and Falling Declaratives as Questions in English*. Outstanding Dissertations in Linguistics. New York: Routledge.
- Heim, Irene. 1990. E-type pronouns and donkey anaphora. *Linguistics and Philosophy* 13:137–177.
- Heim, Irene. 1992. Presupposition projection and the semantics of attitude verbs. *Journal of Semantics* 9:183–221.
- Heim, Irene. 1999. Notes on superlatives. MS, MIT.
- Heim, Irene and Angelika Kratzer. 1998. *Semantics in Generative Grammar*. No. 13 in Blackwell textbooks in Linguistics. Oxford, England: Blackwell.
- Hiraiwa, Ken and Shinichiro Ishikawa. 2002. Missing links: Cleft, sluicing, and the “no da” construction in Japanese. In *MIT Working Papers 43*. GLSA.
- Hirota, Masako. 1996. *Hazu*: its modal and formal aspects. In *Proceedings of the 11th Annual Meeting of Sophia Linguistics Society*, pages 133–152.
- Hoji, Hajime, Satoshi Kinsui, Yukinori Takubo, and Ayumi Ueyama. 2003. Demonstratives in modern Japanese. In A. Li and A. Simpson, eds., *Functional Structure(s), Form and Interpretation: Perspectives from East Asian Languages*. Routledge.
- Iatridou, Sabine. 2000. The grammatical ingredients of counterfactuality. *Linguistic Inquiry* pages 231–270.
- Johnson, Yuki. 2003. *Modality and the Japanese Language*. Center for Japanese Studies, University of Michigan.
- Kamio, Akio. 1994. The theory of territory of information: the case of Japanese. *Journal of Pragmatics* 21:67–100.



- Kamp, H. 1981. A theory of truth and semantic representation. In J. A. G. Groenendijk, T. M. V. Janssen, and M. B. J. Stokhof, eds., *Formal Methods in Study of Languages*. Amsterdam: Mathematical Centre Tracts.
- Kamp, Hans and Uwe Reyle. 1993. *From Discourse to Logic*. Dordrecht, Reidel: Kluwer.
- Kaplan, David. 1989. Demonstratives. In J. Almog, J. Perry, and H. Wettstein, eds., *Themes from Kaplan*. Oxford University Press. Manuscript version from 1977.
- Karttunen, Lauri. 1976. Discourse referents. In J. McCawley, ed., *Syntax and Semantics 7*. New York: Academic Press. Previously distributed by Indiana University Linguistics Club, 1971.
- Kaufmann, Stefan. 2004a. Conditional truth and future reference. To appear in *Journal of Semantics*.
- Kaufmann, Stefan. 2004b. A modal analysis of expressive meaning: German *ja* under quantifiers. Handout of talk presented at Kobe Shoin.
- Kennedy, Chris. 1999. *Projecting the Adjective*. Garland. 1997 UCSC dissertation.
- Kennedy, Chris. to appear. Comparatives, semantics of. In K. Allen (Lexical and Logical Semantics section editor), ed., *Encyclopedia of Language and Linguistics*. Elsevier.
- Klein, Ewan. 1980. A semantics for positive and comparative adjectives. *Linguistics and Philosophy* 4:1–45.
- Koyano, Tetsuo. 1997. Fukusi ‘sekkaku’ no yoohoo [Uses of the adverbial ‘sekkaku’]. In *Nihongo, Nihonbunkakenkyuu [Studies on Japanese Language and Culture]*, vol. 7 of *Osaka Gaikokugodaigaku Nihongo Kooza [Osaka Foreign Language University Japanese Lectures]*. Osaka Gaikokugodaigaku.

- Kratzer, Angelika. 1981. The notional category of Modality. In H.-J. Eikmeyer and H. Rieser, eds., *Words, worlds, and contexts: new approaches in word semantics*, no. 6 in *Research in text theory*, pages 38–74. Berlin: de Gruyter.
- Kratzer, Angelika. 1999. Beyond ouch and oops: How descriptive and expressive meaning interact. Available from Semantics Archive.
- Krifka, Manfred. 1992. Thematic relations as links between nominal reference and event domains. In I. Sag and A. Szabolsci, eds., *Lexical Matters*. Stanford, CA: CSLI Publications.
- Krifka, Manfred. 2001. Quantifying into question acts. *Natural Language Semantics* 9:1–40.
- Kurafuji, Takeo. 1998. Dynamic binding and the E-type strategy: Evidence from Japanese. In *SALT VIII*.
- Kurafuji, Takeo. 1999. *Japanese Pronouns in Dynamic Semantics: the Null/Overt Contrast*. Ph.D. thesis, Rutgers University.
- Landman, Fred. 1990. *Structures for Semantics*. Kluwer.
- Lascarides, Alex and Nicholas Asher. 1993. Temporal interpretation, discourse relations and commonsense entailment. *Linguistics and Philosophy* 16:437–493.
- Laserson, Peter. 2004. Context dependence, disagreement, and predicates of personal taste. Manuscript, University of Illinois.
- Lewis, David. 1970. General semantics. *Synthese* 22:18–67.
- Lewis, David. 1973a. Causation. *Journal of Philosophy* 70:556–567.
- Lewis, David. 1973b. *Counterfactuals*. Oxford: Basil Blackwell.

- Lewis, David. 1979. Scorekeeping in a language game. In R. Bäuerle, U. Egli, and A. von Stechow, eds., *Semantics from Different Points of View*. Berlin: Springer Verlag.
- Mann, William and Sandra Thompson. 1986. Relational propositions in discourse. *Discourse Processes* 9:57–90.
- Marti, Luisa. 2003. *Contextual Variables*. Ph.D. thesis, University of Connecticut.
- Masuoka, Takasi and Yukinori Takubo. 1989. *Kisoo Nihongo Bunpoo [Essential Japanese Grammar]*. Tokyo: Kurosho Syuppan.
- McCready, Eric. 2003. Anaphora and (un)finished objects. In *Proceedings of WC-CFL 23*. Cascadilla Press.
- McCready, Eric. 2004. Two Japanese adverbials and expressive content. In *Proceedings of SALT XIV*.
- McCready, Eric and Brian Reese. 2002. Counterfactual morphology and the licensing of modal subordination in Hindi. Handout of talk given at SALA XXII, University of Iowa.
- Miller, Phillip. 2003. Negative complements in direct perception reports. In *Proceedings of Chicago Linguistics Society 39*.
- Mitchell, Jonathan. 1986. *The Formal Semantics of Point of View*. Ph.D. thesis, University of Massachusetts at Amherst.
- Moriyama, Yoshiyuki. 2001. Syuuziyosi ‘ne’ no intoneesyun [The intonation of the sentence-final particle ‘ne’]. In *Bunpoo to Onsei III [Grammar and Phonology III]*. Kurosio Press.
- Muskens, Reinhard. 1996. Combining Montague semantics and discourse representation. *Linguistics and Philosophy* 19:143–186.

- Neale, Stephen. 1990. *Descriptions*. Cambridge, Mass.: MIT Press.
- Noda, Harumi. 1997. [*No Da no Kinoo*] ‘*The Functions of No Da*’. Tokyo: Kuroshio.
- Noda, Harumi. 2002. Syuuzyosi no kinoo [The functions of sentence-final particles].  
In *Modariti [Modality]*. Kurosio Press.
- Ogihara, Toshiyuki. 1989. *Temporal Reference in English and Japanese*. Ph.D. thesis, University of Texas at Austin.
- Ogihara, Toshiyuki. 1996. *Tense, Attitudes and Scope*. Dordrecht: Kluwer.
- Ogihara, Toshiyuki. 1998. The ambiguity of the *te-iru* form in Japanese. *Journal of East Asian Linguistics* 7:87–120.
- Palmer, Frank Robert. 2001. *Mood and Modality*. Cambridge textbooks in Linguistics. Cambridge, England: Cambridge University Press. Second Edition.
- Pierrehumbert, Janet and J. Hirschberg. 1990. The meaning of intonation in the interpretation of discourse. In P. Cohen, J. Morgan, and M. Pollack, eds., *Intentions in Communication*. MIT Press.
- Potts, Christopher. 2005. *The Logic of Conventional Implicatures*. Oxford University Press. Revised version of 2003 UCSC dissertation.
- Potts, Christopher and Shigeto Kawahara. 2004. Japanese honorifics as emotive definite descriptions. In *Proceedings of SALT XIV*.
- Prior, Arthur. 1967. *Past, Present, and Future*. Oxford University Press.
- Pustejovsky, James. 1995. *The Generative Lexicon*. Cambridge, MA: MIT Press.
- Reyle, Uwe. 1993. Dealing with ambiguities by underspecification: Construction, interpretation, and deduction. *Journal of Semantics* 10:123–179.

- Roberts, Craige. 1987. *Modal Subordination, Anaphora and Distributivity*. Ph.D. thesis, University of Massachusetts–Amherst.
- Roberts, Craige. 1989. Modal subordination and pronominal anaphora in discourse. *Linguistics and Philosophy* 12:683–721.
- Roberts, Craige. 1995. Domain selection in dynamic semantics. In E. Bach, E. Jelinek, A. Kratzer, and B. Partee, eds., *Quantification in Natural Languages*. Kluwer.
- Rooth, Mats. 1985. *Association with Focus*. Ph.D. thesis, University of Massachusetts at Amherst.
- Schlenker, Philippe. 2003. A plea for monsters. *Linguistics and Philosophy* 26:29–120.
- Sells, Peter. 1985. Restrictive and non-restrictive modification. Tech. rep., CSLI. CSLI-85-28.
- Smith, Carlota S. 1997. *The Parameter of Aspect*. No. 43 in *Studies in Linguistics and Philosophy*. Dordrecht: Kluwer. Second Edition.
- Stalnaker, Robert. 1979. Assertion. In P. Cole, ed., *Syntax and Semantics 9*. New York: Academic Press.
- Stone, Matthew. 1999. Reference to possible worlds. Manuscript, Rutgers University.
- Suzuki Kose, Yuriko. 1997. *Japanese Sentence-Final Particles: A Pragmatic Principle Approach*. Ph.D. thesis, University of Illinois at Urbana-Champaign.
- Takubo, Yukinori and Satoshi Kinsui. 1997. Discourse management in terms of mental spaces. *Journal of Pragmatics* 28:741–758.

- Thomason, Richmond. 1984. Combinations of tense and modality. In D. Gabbay and F. Guenther, eds., *Handbook of Philosophical Logic*, vol. 2, pages 135–165. Reidel.
- van der Sandt, Rob. 1992. Presupposition projection as anaphora resolution. *Journal of Semantics* 9:333–377.
- van Rooj, Robert. 2000. Anaphoric relations across belief contexts. In K. von Heusinger and U. Egli, eds., *Reference and Anaphoric Relations*. Kluwer.
- Vanderveken, Daniel. 1990. *Meaning and Speech Acts*. Cambridge University Press. In 2 volumes.
- Veltman, Frank. 1996. Defaults in update semantics. *Journal of Philosophical Logic* 25:221–261.
- Vendler, Zeno. 1967. *Linguistics in Philosophy*. Ithaca, NY: Cornell University Press.
- von Fintel, Kai. 1994. *Restrictions on Quantifier Domains*. Ph.D. thesis, University of Massachusetts at Amherst. Published by GLSA.
- von Fintel, Kai. 2002. Counterfactuals in a dynamic context. In M. Kenstowicz, ed., *Ken Hale: a Life in Language*. MIT Press.
- Waltereit, Richard. 2001. Modal particles and their functional correlates: a speech-act theoretic approach. *Journal of Pragmatics* 33:1391–1417.
- Wang, Linton, Eric McCready, and Nicholas Asher. 2003. Information dependency in quantificational subordination. To appear in *Where Semantics Meets Pragmatics: the Michigan Papers*, K. von Heusinger and K. Turner, eds., Elsevier.

- Ward, Gregory and Julia Hirschberg. 1988. Intonation and propositional attitude: the pragmatics of L\*+HLH%. In *Proceedings of the Fifth Eastern States Conference on Linguistics*, pages 512–522.
- Webber, Bonnie, Matthew Stone, Aravind Joshi, and Alastair Knott. 2001. Anaphora and discourse semantics. To appear in *Computational Linguistics*.
- Westmoreland, Robert. 1998. *Information and Intonation in Natural Language Modality*. Ph.D. thesis, Indiana University.
- Zanuttini, Raffaella and Paul Portner. 2003. Exclamative clauses at the syntax-semantics interface. *Language* 79(1):39–81.
- Zeevat, Henk. 2003. Particles: presupposition triggers, context markers, or speech act markers. In R. Blutner and H. Zeevat, eds., *Optimality Theory and Pragmatics*. Palgrave-MacMillan.

# Vita

Eric Scott McCready Jr. was born in Toledo Ohio in 1973. He grew up there, in Madison, Wisconsin, and in Austin Texas. He received his B.A. from the University of Oregon in Japanese and Asian Studies in 1996, and spent some time in Japan after that before coming to the University of Texas at Austin.

Permanent Address: 2200 French Place, Austin TX 78722, USA

This dissertation was typeset with L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> by the author.