

A MINIMAL THEORY OF ADVERBIAL QUANTIFICATION

Kai von Fintel (MIT)

Summer 1995
(with minimal revisions from February 1996)

Now published in *Context Dependence in the Analysis of Linguistic Meaning*, Volume 11 of "Current Research in the Semantics/Pragmatics Interface", edited by Barbara Partee & Hans Kamp, Elsevier, 2004, pp. 137-175.

0. Introduction
1. Situation Semantics for Adverbial Quantification
2. The Problem of Semantic Partition
3. The Context-Dependency of Adverbial Quantifiers
4. Focus and Quantification
5. Quantificational Variability

This paper is a revision of parts of my dissertation (von Fintel 1994). For helpful discussion and comments, I am particularly indebted to Angelika Kratzer, Barbara Partee, Irene Heim, Roger Schwarzschild, Arnim von Stechow, Susanne Tunstall, the members of the Spring 1994 semantics seminar at MIT, the audience at SALT 4 (University of Rochester, May 6, 1994), and the audiences at a colloquium and a workshop at the University of Rochester, February 3, 1995. I also thank Henriëtte de Swart for her critique of my dissertation (de Swart 1995).

Kai von Fintel
Department of Linguistics and Philosophy
E39-245, Massachusetts Institute of Technology
Cambridge, MA 02139
fintel@mit.edu
<http://web.mit.edu/linguistics/www/fintel.home.html>

0. INTRODUCTION

Much recent work in the area of semantics and linguistic theory argues that adverbially quantified sentences have a tripartite logical form in which the restriction of the adverbial quantifier is explicitly represented. Considerable machinery is devoted to deriving the correct restriction. Proposals for this process of “semantic partition” include the following: Rooth (1985, 1991), Krifka (1992b), and Partee (1991) propose that focused material is mapped into the nuclear scope of operators. Berman (1990) suggests that presupposed material is mapped into the restrictive clause. Diesing (1990, 1992) claims that material that is VP-external at LF is mapped into the restrictive clause. Chierchia (1992, 1993) says that topics belong in the restrictive clause. All of these proposals seem to be reducible to claims about the relation between information structure and quantification.

In this paper, I sketch and explore the possibility of a “minimal” theory of adverbial quantification, with the following claims:

- Adverbs of quantification quantify over situations.
- Their domain is an anaphor subject to pragmatic anaphora resolution.
- Apparent “semantic partition” is an epiphenomenon.

The analysis is minimal in that it does not allow adverbial quantifiers to bind multiple variables and in that it does away with mechanisms that create tripartite representations. The proposal brings together two strands of research: (i) a situation-semantic treatment of adverbial quantification, as pioneered by Berman (1987) and Heim (1990), and (ii) an emphasis on the pragmatic determination of quantifier restrictions, as recently explored by Roberts (1995), Rooth (1992), and Schwarzschild (1993), and also in work by Vallduví (1992) and Dryer (1994). If successful - and there remain considerable doubts - this approach would minimize the role of parochial rules operating in the syntax/semantics-interface. However, there are numerous, albeit fascinating, complications.

The context contains among other elements a set of salient discourse topics, understood as sets of propositions. The intuitive idea is that sentences are uttered against the background of such discourse topics (going back to ideas of Aristotle, Collingwood, and many other scholars). These discourse topics can be the denotation of explicit or implicit questions. The domain argument of an adverbial quantifier is an anaphoric element that needs a discourse topic as antecedent (the quantifier will actually quantify over the generalized union of the discourse topic, going from sets of propositions to sets of situations). Crucially, the topic/focus articulation of a sentence is

also interpreted as anaphoric to discourse topics (in an extension of the proposals in Rooth 1992b). In the analysis of the influence of sentence-internal topic-marking on the determination of quantifier domains, I posit a T-feature (analogous to the usual F-marking of focus constituents) which is interpreted as introducing an anaphoric element that needs to be licensed by discourse topics. The crucial point now is that in the unmarked situation, we find that both the quantifier domain and the sentence-internal pragmatic structure are anaphoric to the same discourse topic. The apparent local relation is an epiphenomenon of general anaphoric processes and there is no need for local automatic processes of semantic partition that operate in the interface between syntax and semantics. The central force at work is the anaphoric dependence of quantifier domains on the discourse context.

My analysis offers a more parsimonious account of so-called semantic partition. By appealing to independently motivated pragmatic processes of anaphora resolution, we can develop a more compositional view of the interpretation of quantificational structures, avoiding costly interpretive mechanisms.

1. SITUATION SEMANTICS FOR ADVERBS OF QUANTIFICATION

Heim in her 1990 paper “E-Type Pronouns and Donkey Anaphora” explored the possibility of returning to a rather conservative analysis of adverbially quantified sentences. She defended the following assumptions:

- Indefinites are existential quantifiers.
- Pronouns are semantically equivalent to definite descriptions.
- Adverbs of quantification quantify over just one variable: situations.

Building on Berman (1987), the idea was that adverbs of quantification relate two sets of situations. In an example like (1), the first set is supplied by the *when*-clause and the second set comes from the main clause.

- (1) When Kim visits her parents, she often takes the train.

The sentence is analyzed as claiming that many situations in which Kim visits her parents are situations in which Kim takes the train.

Typical donkey sentences contain an indefinite in the *when*-clause and an intuitively coreferential pronoun in the main clause:

- (2) When John is offered a piece of pie, he usually eats it.

Heim argued that the adverb here quantifies over a set of relatively small situations in each of which John is offered one piece of pie. Situations where he is offered more than one piece are

split up into smaller one piece situations. The donkey pronoun is analyzed as a covert definite description, roughly “the piece of pie John is offered”, whose uniqueness presupposition is harmlessly satisfied in the small one piece situations.

Single variable analyses of adverbial quantifiers are not unheard of. Lewis (1975) actually considered quantification over times or events as more intuitive accounts but rejected them in favor of unselective quantification. Stump (1981) and Rooth (1985) use quantification over times. See also Partee (1984b) and Bäuerle & Egli (1985). De Swart (1991) uses quantification over events. While most of my paper concentrates on the pragmatic identification of quantifier domains, there will need to be some discussion of the adequacy of a single variable analysis.

With Berman and Heim, I will adopt Kratzer’s version of situation semantics (1989a; 1990; 1991a), in which situations are seen as parts of possible worlds.¹ There is a set S of possible situations. Situations stand in a part-whole relation. For each situation there is a maximal element with respect to the part-whole relation. These maximal elements are the possible worlds.² Propositions are sets of situations, intuitively those where the proposition holds. We assume that all natural language propositions are persistent sets of situations. A proposition is persistent iff, for each situation in it, it contains all supersituations of that situation. This means in particular that if a proposition is true in some small situation s it will also be true in the world w_s that s is part of.³ We will also assume that the ontology of situations is closed under arbitrary mereological summation of situations. We hold that any a priori restriction on summation would be an unwarranted restraint on the plenitude of logical space. Thus, there is a situation that contains all and only my left earlobe, the square root of 2, and Brutus stabbing Caesar.

Now, the idea is that adverbs of quantification denote relations between sets of situations, just like determiner-quantifiers denote relations between sets of entities. So, *often - when $p - q$* would claim that many situations (parts of worlds, world chunks) in which p is true are also world-chunks in which q is true. But there is an immediate problem here. Counting situations is made quite hard by the part-whole structure of the domain of situations (note the parallel with the semantics of mass terms). This can already be illustrated with cardinal frequency adverbs:

¹The situation semantics of Barwise & Perry (1983) is very different from the approach taken by Kratzer and adopted here. For some comparisons and applications, the reader is referred to Portner (1992). For some of the choices involved in building a situation semantics, see Barwise (1989: Chapter 11, “Notes on Branch Points in Situation Theory”).

²The condition that there be exactly one maximal situation for each situation implies that one individual or one situation cannot be part of more than one possible world: individuals and situations are world-bound. To speak of possible alternatives to an actual individual, we have to resort to counterpart theory, as advocated by Lewis (1968, 1971, 1986). Since this complication is not central to our concerns, we will ignore it.

³For discussion, the reader can consult Barwise & Perry (1983), Kratzer (1989a), Landman (1986), and Portner (1992).

- (3) John climbed Mt. Holyoke twice.

This sentence should obviously not be true in a world where John only climbed Mt. Holyoke once. But clearly, even if John climbed Mt. Holyoke only once, there will be many situations in which John climbed Mt. Holyoke. For example, there is the situation that contains John's climbing Mt. Holyoke and the celebratory dinner he had afterwards. To correctly count Mt. Holyoke-climbing situations, we have to get rid of all sorts of irrelevant junk. What we want to do is count minimal situations in which John climbed Mt. Holyoke, situations that have no proper parts in which John also climbed Mt. Holyoke. The notion of minimality of situations is defined as follows:

- (4) Minimality (Berman 1987; Heim 1990)

For any set of situations S, the set of minimal situations in S,
 $\min(S) = \{s \in S : \forall s' \in S (s' \leq s \Rightarrow s' = s)\}.$

The minimal situations in a set of situations, i.e. in a proposition, are those that do not have proper parts that are also in the set. They are the ones that contain just enough parts to support the proposition, they have no parts that can be removed such that the stripped down situation still supports the proposition. Berman and Heim show that this independently needed device will nicely take care of the notorious sage plant example.

Berman and Heim do not discuss the question whether all propositions necessarily have minimal supporting situations. As pointed out to me by Angelika Kratzer, there are in fact propositions that do not seem to have minimal situations. This is similar to what happens in the domain of entities with mass nouns which have the subdividability property: any part of water is still water. In the domain of situations, we have imperfective or atelic propositions: any running situation has a proper part which is still a running situation. Even if we should end up with some very small undividable running situations, those will not be what we are counting:

- (5) Often, when John runs, he wears his old tennis shoes.

Apparently, (5) counts situations in which John starts to run, runs, and stops. See Bach (1981: 74) for a similar observation. We might try to define a notion of "maximal uninterrupted situation" and find exactly the right situations for adverbs to count. (That would create a tension with the notion of minimality, but perhaps no more than an emotional one.) But that won't be easy. It is made particularly hard by the fact that our system allows arbitrary summation of situations. So, there will be a situation that is made up of the first segment of John's Friday run and the last segment of his Sunday run. This can be excluded as one of the situations quantified over in (5) only if we introduce time (and perhaps aspect) into our system. I will chicken out at this point and leave this issue for some other time. Most of the propositions that we will consider

are perfective: either because they involve perfective predicates or because they contain an existential quantifier over count entities (i.e. the crucial cases of quantificational variability as in *I usually like a foreign movie*). Note that we couldn't impose the maximal chunks solution on the indefinite cases: we need there to be one liking situation per movie even if they occupy adjacent regions of the world. (And if the guns of Navarrone hit the guy twice at the same time, we have further problems). The issue of individuating the right situations to quantify over is one of the major tasks for further research.⁴

Having stared these vexing problems squarely in the face, let us now move on and boldly assume that adverbs only quantify over the minimal situations in their first argument. So, *often - when p - q* would claim that many minimal situations (parts of worlds, world chunks) in which *p* is true are also world-chunks in which *q* is true. But, minimal *p*-situations don't stand much of a chance of being *q*-situations as well. They contain nothing beyond what makes them *p*-situations, which may not be enough to make them *q*-situations. Take our example (1). The minimal situations in which Kim visits her parents do not need to contain her mode of transportation. So, what we need to demand of the minimal visiting situations is that they must be part of a situation in which Kim takes the train. Let's formalize this:

$$(6) \quad \left[\left[\delta \text{ when } p \text{ } q \right] \right] = \left\{ s: \llbracket \delta \rrbracket \left(\min(\llbracket p \rrbracket), \left\{ s': \exists s'' (s' \leq s'' \ \& \ s'' \in \llbracket q \rrbracket) \right\} \right) \right\}$$

An adverbially quantified sentence δ - *when p - q* will be true in a situations *s* if δ -many of the minimal *p*-situations are extendable into *q*-situations.⁵ Now note that, as it stands, the adverbially quantified statement talks about all minimal *p*-situations in all possible worlds. This is surely too strong. For one thing, it will make the proposition non-contingent, which is not what we want. For example, we want to be able to truthfully say:

(7) Joan always takes the bus home if it rains, but it could have been otherwise.

We could specify that adverbs only quantify over *p*-situations in the evaluation world. But that would ignore the intensional character of at least some adverbs of quantification (*usually*,

⁴See my reply to Dekker (von Fintel 1995) for a little more on this problem. Similar issues of partitioning a part-whole domain into countable entities arise in quantification over kinds (Carlson 1977: 346ff) and in plural quantification (Schwarzschild 1991).

⁵Chris Barker (p.c.) pointed out to me that this is somewhat counterintuitive: it seems that Kim's taking the train is part of her visit to her parents, rather than the other way round. This tension between analysis and intuition deserves further thought.

traditionally).⁶ A more generally applicable move would follow the results of work on modals and say that adverbs quantify only over accessible p-situations:

$$(8) \quad \left[\left[\delta \text{ when } p \text{ } q \right] \right] = \left\{ s: \llbracket \delta \rrbracket \left\langle \min(f(s) \cap \llbracket p \rrbracket), \left\{ s': \exists s'' (s' \leq s'' \ \& \ s'' \in \llbracket q \rrbracket) \right\} \right\rangle \right\}$$

In this formalization, *f* is a function from (evaluation) situations to sets of (accessible) situations. It plays a role very similar to Kripke’s accessibility relations or Kratzer’s conversational backgrounds. Its identity is largely contextually determined.

One last thing we need to fix. For E-type pronouns in the main clause to refer back to the situations quantified over, those situations need to be accessible. We will introduce the notion of a reference situation that is passed along as a parameter of interpretation. E-type pronouns take this reference situation as an argument. Here’s what we have now:

$$(9) \quad \left[\left[\delta \text{ when } p \text{ } q \right] \right] = \left\{ s: \llbracket \delta \rrbracket \left\langle \min(f(s) \cap \llbracket p \rrbracket), \left\{ s': \exists s'' (s' \leq s'' \ \& \ s'' \in \llbracket q \rrbracket^{s'/r}) \right\} \right\rangle \right\}$$

Let me note an interesting consequence of this analysis (I have benefitted from comments by Angelika Kratzer and Arnim von Stechow on this matter). If *q* does not contain an element that refers back to the *p*-situations, the semantics in (9) is trivialized. Consider a situation *s* in which *q* holds: then by persistence, *q* also holds in the world *w_s*. But that means that all situations that are part of *w_s* are in fact part of a *q*-situation, namely *w_s*. Which means, that in a *q*-world, *always p q* will automatically be true, *never p q* will automatically be false, and so on. This threat of triviality will not arise when there is a donkey structure:

(10) When I see a new Hillermann book, I always buy it immediately.

Here, the *q* is not independent of *p*. For each *p*-situation, in which I see a new Hillermann book, a different *q*-proposition will be relevant. We’re counting *p*-situations which are extendable into situations in which I buy that book. Now, there can be no spurious pairing of an arbitrary *q*-situation with a given *p*-situation. In fact, it is fairly hard to come up with examples that would have no anaphoric connection between the two propositions:

(11) No matter when I call, John is always away from his desk.

There appears to be at least a temporal dependency in (11). I think that the best examples involve predicates that arguably are not temporally located:

⁶Roger Schwarzschild (p.c.) pointed out to me that it is not so clear how far the intensionality of these adverbs goes. After all, *John usually dies gracefully* seems to presuppose that John dies more than once in the actual world, rather than being satisfied with a multiplicity of merely possible deaths. The discussion here would also eventually need to turn to the semantics of generic propositions. There is an idea around that generics should be analyzed as involving an implicit quantifier of modal/adverbial nature. More on generics can be found in von Stechow (1996a&c).

- (12) a. #When Mary knows French, she usually knows it well.
 b. #When Mary speaks French, she usually knows it well.

These examples were given by Kratzer (1989b), in the context of an unselective binding account of adverbial quantification, to argue the point that predicates like *know* do not have an event argument. Since there is no other argument that the adverbs in (12) could bind, the sentences are ruled out by a prohibition on vacuous quantification that checks the presence of co-bound variables in restriction and scope. We cannot adopt this explanation, because for us there is always a situation variable around. But we can use the fact that our semantics predicts the sentences in (12) to be trivial. (12a) is trivial because the *when*-proposition does not provide an antecedent for the main clause to pick up with a donkey pronoun. (12b) is trivial because the main clause proposition does not pick up any antecedent from the *when*-proposition. To make the prediction that the sentences in (12) are anomalous, we can either rely on the assumption that natural language abhors sentences that are automatically trivial. Or, we can stipulate:

- (13) δ - *when* p - q is only felicitous
 iff there are at least two situations s and s' in $\llbracket q \rrbracket$ such that $\llbracket q \rrbracket^s_r \neq \llbracket q \rrbracket^{s'}_r$.⁷

This should suffice as a preliminary sketch of the situation-semantic approach to adverbial quantification. There are several important problems for such an analysis, discussed candidly in Heim's paper. In this paper, I revise and extend Heim's analysis in order to deal with the phenomenon of "semantic partition" in sentences without explicit restrictors. Building on ideas in Roberts (1995), I will argue that the domain of adverbs is contextually restricted and as such the target of pragmatic anaphora resolution. If successful, this approach would minimize the role of mechanisms that create tripartite structures. The result would be a leaner and cleaner syntax/semantics interface.

⁷Something similar is proposed in de Swart (1991).

2. THE PROBLEM OF “SEMANTIC PARTITION”

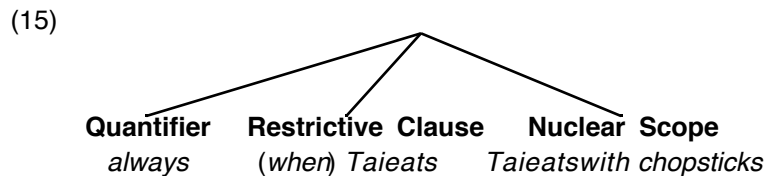
Adverbs of quantification differ from their determiner cousins in that they do not syntactically require a restrictive argument: the appearance of conditional restrictors is optional. When adverbs do not wear their restrictions on their sleeve, there is work to be done between the surface appearance of a sentence and its ultimate interpretation. For example, Quine (1966: §37, pp. 90-92) noticed the ambiguity of (14):⁸

(14) Tai always eats with chopsticks.

The preferred reading is clearly not the one which claims that in all situations, Tai can be found eating with chopsticks. Instead, the sentence is most naturally read as claiming that in all situations in which Tai eats, Tai eats with chopsticks.⁹ The interesting problem is how we arrive at this interpretation. Here are two approaches to this issue:

- Semantic Partition

Most analysts assume that the restriction on the adverb is made explicit in the logical form and is computed by grammatical processes. They would claim that the LF of (14) under the preferred reading has this “tripartite” structure:



Explicit representations like this are not only assumed in unabashedly rich theories like DRT, but are also used in a lot of other works. There have been a number of proposals as to how exactly the sentence is split into these three parts. Rooth (1985, 1991), Krifka (1992), and Partee (1991) propose that focused material is mapped into the nuclear scope of operators. Diesing (1990, 1992) claims that material that is VP-external at LF is mapped into the restrictive clause. Chierchia (1992, 1993) says that topics belong in the restrictive clause. All of these proposals seem to be reducible to claims about the relation between information structure and quantification. The proposals all involve using informational notions in the computation of grammatical representations.

⁸This early reference was mentioned by Bennett & Partee (1978) but was then lost in the mists of time. I am indebted to Roger Schwarzschild for bringing it to my attention.

⁹Why does the weird reading become preferred when we switch to the progressive?

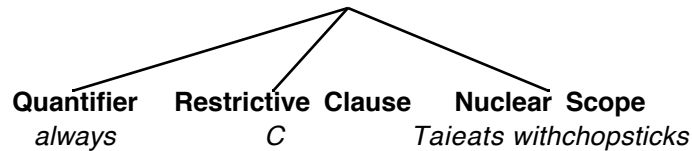
(i) Tai is always eating with chopsticks.

My suspicion is that it has to do with the stativity (atelicity) of the predicate. Atelic predicates do not like to be in the restriction (because of the minimality requirement?). This deserves further research, see Johnston (1994) for some relevant ideas.

- Pragmatic Partition

My project will be to show that there is no need for semantic partition. The central point is that the domain of quantifiers is an anaphor whose reference is pragmatically determined. The logical form of (14) will simply be something like this:

(16)



The apparent process of semantic partition disappears when we look at the context of adverbially quantified sentences. In the absence of explicit contextual information, the anaphoric structure of the nuclear scope can help us reconstruct the context, which in turn can help us figure out what the intended domain might be. The kinds of anaphoric clues I will discuss include: (i) the Topic/Focus Articulation (TFA) of the nuclear scope, (ii) certain syntactic movements (e.g. German scrambling), which I take to be a way of marking topics. Note that it is immediately obvious that there are devices that obligatorily and automatically restrict quantifiers: most prominently, the common noun phrase argument of determiner-quantifiers, and restrictive *if/when*-clauses. The claim I want to explore in this paper is that the pragmatic organization of the nuclear scope is not a grammaticalized source of quantifier restrictions.

3. THE CONTEXT-DEPENDENCY OF ADVERBIAL QUANTIFIERS

The main ingredient of my reanalysis of semantic partition is that quantifiers are anaphoric elements. More precisely, quantifiers have a hidden domain argument, whose value is contextually supplied. That the domain of quantifiers is often subject to pragmatic influences is hardly shocking news. A nice formulation of this fact was given by Lewis: “Remember that part of the ordinary meaning of any idiom of quantification consists of susceptibility to restrictions; and that restrictions come and go with the pragmatic wind” (1986: 164). Consider a simple example of the pervasiveness of this pragmatic wind. Talking about last night when some of us went out for pizza, I say:

(17) Everyone had a great time.

No doubt that (17) is not meant as the extravagant claim that everyone in the whole world had a great time. Instead, I intended to talk about whoever went out last night. There is much that could be said about the context-dependency of quantifiers. I refer the reader to my dissertation for discussion and references. The analysis I will adopt is this: determiners are (partially) anaphoric expressions similar to pronouns and other such elements. In essence, determiner-quantifiers are interpreted as if they were partitives with a pronominal argument. *Everybody* means something like *every one of them*.

We will interpret the determiner relative to a contextually supplied set, a resource domain:¹⁰

(18) Quantifier Indexing Rule (First Version)
Index quantifiers with indices of the form C_i of type $\langle e, t \rangle$.

The semantics of the quantifier is changed so as to intersect the first argument with the value of the resource domain variable.

(19) $[[\text{most}_{C}]](A, B)$ iff $[[\text{most}]](C \cap A, B)$.¹¹

An example of how a quantified sentence now gets represented:

(20) $[[\text{most}_{C} \text{ students}]_y \text{ John talked to } t_y]$

A quantified NP contains two indices: the index on the determiner, which is interpreted as the resource domain, and the index on the NP, which plays the usual role.

¹⁰I use “C”, to evoke “context variable” or “Cooper-variable”, the latter because Robin Cooper used such a variable in the interpretation of various kinds of noun phrases (1975, 1979). Sometimes, I call C the *resource domain* of the quantifier. Westerståhl uses the term *context set*, but that is already in use in formal pragmatics for the set of currently accessible worlds. My terminology is inspired by the use of “resource situations” in Barwise-Perry style situation semantics, see most recently Cooper (1993).

¹¹Here and elsewhere, I will equivocate between C as the context variable in logical forms and C as the value assigned to the variable after anaphora resolution.

How is the identity of the resource domain determined in a particular utterance situation? Just as with other indexical categories, we find deictic, anaphoric, and bound occurrences of resource domain variables. In most cases, it might suffice to say that the most salient resource domain is picked deictically. This is presumably the correct analysis of cases like this one: Walking into the classroom, I say *Everyone is so quiet. What's wrong?* However, sometimes the value of the resource domain is established linguistically. Such an anaphoric use occurs for example if I report to you *When I walked into my class today, everyone was really quiet. It made me suspicious.* But the phenomenon of “quantified contexts” makes it obvious that we need even more complex structures. Consider:

(21) Only one class was so bad that no student passed the exam. (Heim 1991)

Here, the contextual restriction on the quantifier *no student* is probably something like “in class x” where the variable x is bound by the higher quantified subject. What we need then is resource domains of some complexity. A structure like (22) would do the trick:

(22) [only one class]₆ was so bad that [no_{f₁₂(v₆) student]₉ passed the exam.}

Here, the intended value of the variable f₁₂ is a function that takes classes and yields the students in that class. Its argument variable v₆ is bound by the higher quantifier *only one class*. The new rule we need is this:¹²

(23) Quantifier Indexing Rule (Revised Version)

Index quantifiers with indices of the form $f_i^n(v_1, \dots, v_n)$, where f_i^n is an n -place functor variable whose arguments are n -tuples and whose values are sets of individuals in A, and where v_1, \dots, v_n are variables of the appropriate type.

What happens with adverbial quantifiers? They are anaphoric as well. Since their domain is a set of situations, they are anaphoric to contextually supplied sets of situations. In fact, we already discussed this point: adverbs need to be relativized to accessible situations (otherwise their semantics will be too strong). We proposed this analysis:

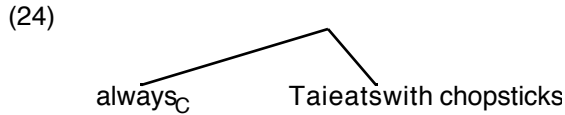
(9) $\llbracket \delta \text{ when } p \text{ } q \rrbracket = \left\{ s: \llbracket \delta \rrbracket \left\langle \min(f(s) \cap \llbracket p \rrbracket), \left\{ s': \exists s'' (s' \leq s'' \ \& \ s'' \in \llbracket q \rrbracket^{s'/r}) \right\} \right\rangle \right\}$

It should be obvious that this is fairly similar to what we just said about the complex context-dependency of determiner-quantifiers. We have a functional variable whose value is contextually determined and whose argument is bound by a higher operator. Now, consider a case where there is no *when*-clause:

(14) Tai always eats with chopsticks.

¹²The format of (23) closely follows the LF proposed for E-type pronouns in Heim (1990), which in turn is based on Cooper (1979).

What I propose is this. The adverb is relativized to quantify only over accessible situations. The logical form we now assume looks like this:



The LF in (24) is the final logical form of this sentence. What comes next is pragmatically informed anaphora resolution. *C* is an anaphor that needs a set of situations supplied by the context as its antecedent. Here is the new semantics for adverbs:¹³

$$(25) \quad \llbracket \delta_C \hat{q} \rrbracket = \left\{ s: \llbracket \delta \rrbracket \left(\min(C(s)), \left\{ s': \exists s'' (s' \leq s'' \ \& \ s'' \in \llbracket q \rrbracket^{s/r}) \right\} \right) \right\}$$

The interpretation we get for (24) is that most situations in the contextually supplied set of situations *C* are ones in which Tai eats with chopsticks. The sentence is interpreted as something like “most of those *C*-situations are ones in which Tai eats with chopsticks”. Again, what we want is probably a set of situations in which Tai eats.

The claim I want to defend is that the domain *C* has to be previously established in the context.¹⁴ Clearly a speaker who utters (14) has some domain *C* in mind, but that won’t help the hearer (unless she can read minds). So, either *C* must have been introduced earlier in the discourse or there must be circumstantial clues to its identity. I will first discuss the introduction of resource domain in discourse. Then I turn to circumstantial clues, which is what I think so-called semantic partition is all about.

The simplest case comes from examples of modal subordination:

- (26) When we get a letter from Europe, Sam always reads it first.
 Sandy sometimes doesn’t get to see it till the next day.

Here the restriction of the adverb *sometimes* comes from the same *when*-clause that was used in the earlier sentence to restrict the adverb *always*.

But there are other, perhaps more interesting, ways of contextually restricting adverbs. The most important way, I think, in which adverbs are contextually restricted is by questions, explicit or implicit. Consider:

¹³I will leave aside the issue about what to do with restrictive *when*-clauses now. Somehow, we want to devise a treatment that would intersect the *when*-proposition with the set of accessible situations. But how this can be done is quite a puzzle, see my dissertation and Roberts (1994) for some ideas.

¹⁴Enç (1991) assumes that all quantifiers are specific, which means in the terms of my analysis that all quantifiers have a familiar resource domain.

- (27) A: How does Tai eat?
 B: Tai always eats with chopsticks.

As I see it, the restriction of the adverb in (27) is given by the question. We therefore have to figure out how the question can serve as the right kind of antecedent for the domain variable C . The semantics developed in Hamblin (1973) gives as the value of a question the set of possible answers to it, both true and false. In our case, the semantic value of ‘How does Tai eat?’ is the set of propositions of the form ‘Tai eats in manner x ’. The union of this set of propositions is the set of situations in which Tai eats in some manner. This is now indeed the right kind of antecedent for the domain variable C .¹⁵ We end up with the following representation of the question-answer pair where the anaphoric link is made explicit by co-indexing:

- (28) A: S_i
 How does Tai eat?
- B: S
 always $\cup C_i$ Tai eats with chopsticks

Questions, explicit or implicit, can be seen as *discourse topics*, as what a discourse is about. This is an old idea. Sentences are uttered against the background of such discourse topics. That questions are always in the background of any utterance is captured in a nice aphorism by Collingwood: “Every statement that anybody ever makes is made in answer to a question” (1940). Questions as discourse topics is also important for Lauri Carlson:

“Questions serve to state the *topic* of a dialogue, in other words, what the dialogue is about or what it wants to accomplish. An information sharing dialogue is aimed to create a common understanding about its topics, expressed as questions which the dialogue participants are interested in (accept). The topical questions determine, by means of the dialogue rules and the definition of answerhood, which further questions and declarative sentences are relevant to the dialogue” (1983: 222).

I will assume that in general *discourse topics are sets of propositions in the discourse context*. These can correspond to explicit or implicit questions. The sets of situations needed for the restriction of adverbial quantifiers can be gotten by forming the union of these sets of propositions. There are various other ways that sets of propositions could be found in the context. There are sets of propositions in the context as envisioned by widely accepted theories of meaning: the common ground of Grice and Stalnaker is a set of propositions, the conversational backgrounds of Kratzer are functions from situations to sets of propositions. The notion of an “open proposition”, which is central to the work of Ellen Prince and her school of pragmatics,

¹⁵The necessity of taking the union of a set of propositions to give the right domain for the adverb was noticed by Rooth (1985). As Roger Schwarzsgild (p.c.) correctly pointed out to me, the proposal in the text ignores that the question *How does Tai eat?* already seems to involve reference to a generality of situations, it asks about Tai’s eating habits.

can be seen as essentially equivalent to our conception of a set of propositions which is generated by considering alternatives to focussed or questioned constituents (Prince 1978, 1981, 1993; Ward and Hirschberg 1985; Ward 1986; Ward and Prince 1991; Ward, Sproat, and McKoon 1991). Other relevant references, cited by Beaver (1995), include Strawson (1964), Belnap (1969), and van Kuppelvelt (1991).

One way then for the hearer to identify the intended domain of an adverbial quantifier is to find an antecedent in the previous discourse, to find a discourse topic co-referential with the domain anaphor. Since discourse topics more often than not are implicit questions, figuring out which question the speaker has in mind will be hard. My claim is that semantic partition is a kind of mind-reading mechanism. The nuclear scope often contains anaphoric elements that provide information about the context. Since the quantifier domain also depends on the context, the clues in the nuclear scope can provide indirect information about the quantifier domain. There is no need for direct, automatic mechanisms that map material into the restriction. We will specifically look at two kinds of clues: (i) focus-marking, (ii) topic-marking. But before we do that, let me spend some time on certain points of methodology.

It may seem that the pragmatic account, which posits mysterious ways of intuiting the presence of discourse topics, is hopelessly wishy-washy and should therefore not be considered seriously. See for example de Swart (1995) for sentiments of that sort. What I will do in the rest of this section is (i) admit that the pragmatic account, like accounts of anaphora resolution in general, cannot rely on a tidy little automatic procedure, (ii) argue that the pragmatic account is conceptually very attractive to the point of being the null hypothesis, (iii) show that, vague as it is, the pragmatic account is eminently falsifiable, (iv) suggest that our energy should be spent on trying to falsify the account.

The Wishy-Washiness of Anaphora Resolution. Note that I am not claiming that there is such a thing as the discourse topic. What a discourse is about, the sequence of questions driving it, must be a very dynamic process. The question of how exactly discourse topics are identified is a performance issue and will be exceedingly difficult. For an impression of what needs to be done, consider the following dialogue:

- (29) A: How will John get to school?
B: He usually walks.

There is a clash here between A's question, which is about a specific situation, and B's response, which talks about a general kind of situation. Nevertheless, there is apparently no problem in determining the quantifier domain from the question meaning. How can we make sure that the appropriate set of propositions is in the context to serve as the antecedent for the quantifier

domain variable? We need to allow a process of generalizing a discourse topic.¹⁶ We have probably reached the limits of where we stand much chance of directly computing a topic of the right semantic value to constrain a quantifier. Consider the following dialogue:

- (30) A: I guess it's kind of a long way to school from here.
 B: Actually it isn't. I usually walk.

Again, the quantifier domain here is presumably something like 'when I go to school'. But how is an implicit question like that to be computed? Trying to devise an explicit analysis of such computations would be a truly heroic endeavour.¹⁷ Variations on (30) from de Swart (1995) show that the hearer needs to do a lot of work in order to identify the intended quantifier domain:

- (31) A: I guess it's kind of a long way to school from here.
 B₁: Actually it isn't. I usually have lunch at home.
 B₂: Actually it isn't. The bus usually takes less than half an hour.
 B₃: Actually it isn't. The village children usually go to this school, rather than to a private school.

This shows that the kinds of implicit questions that a sentence can answer are subject to complex inferencing. We could spend some time here on discussing other areas of natural language anaphora where pragmatic discourse inferencing is necessary. Consider for example this sentence from Dahl & Hellman (1995):

- (32) Smith beats his dog although this was forbidden already fifty years ago.

Clearly what was forbidden wasn't that Smith beat his dog but something more general. The point is that we need to admit that anaphora resolution is a complex business. A complex business whose description and analysis does not need to be, and hence shouldn't be, replicated in the principles of grammar. The claim of the pragmatic account of "semantic partition" is that it is exactly the same kind of thing as anaphora resolution.

Conceptual Advantages of the Pragmatic Account. Using the pragmatics to constrain values for quantifier domains that are underspecified by the linguistic form of a quantified statement raises questions about the interactions between semantics and pragmatics and the consequences for the organization of the grammar. One pretty picture of how semantics and pragmatics interact is that the semantics is autonomous and that the points of contact are highly circumscribed. See Kamp (1979), Gazdar (1979), Partee (1984a), and Rooth (1985) for discussion. I think that this view of autonomy is also explicit in much of the methodology and empirical practice of generative grammar. It is entirely consistent with such a program to treat the context-dependency of quantifiers as a pragmatic matter. The postulation of free variables, such as our resource domain

¹⁶Roger Higgins (p.c.) points out that B's responses in (29) and (30) are not direct answers to the questions. Quite so, but nevertheless they are quite coherent partial answers, see Groenendijk & Stokhof (1984) for more on the pragmatics of answers.

¹⁷See Asher (Asher 1995) for steps towards an explicit theory of discourse inferencing.

variables, is a typical tool in isolating the points of contact between semantics and pragmatics. These free variables are holes in the semantic structures which will be filled by the pragmatics. What the autonomy thesis does prohibit is the postulation of any processes in the sentence grammar that make reference to pragmatic properties of sentences. Now, semantic partition proposals do use what seem to be essentially pragmatic notions directly in the semantic identification of a quantifier domain: most of them use the topic/focus-articulation of the nuclear scope to determine the quantifier domain. From the perspective of the autonomy thesis, the pragmatic account is clearly preferable. The pragmatics is seen to supply the value of a free variable quantifier domain and various factors, among them topic/focus-articulation (TFA), are simultaneously at play that function as partial clues as to what domain is intended. There are no rules of grammar that make reference to TFA.¹⁸

There is an uninteresting way in which the autonomy theory might be attacked. After all, focus is not a purely pragmatic notion: it surfaces as particular stress patterns or in particular word ordering facts. Hence, focus does enter into the description of phonological and/or syntactic rules. But, this could not possibly be otherwise! Looking at a sentence, we must be able to tell what the focus of the sentence is and this information can be phonological or syntactic. As pointed out to me by Angelika Kratzer, the status of focus and topic is similar to the status of discourse particles in languages like German or Ancient Greek. The question is whether the influence of these pragmatic notions on the identification of quantifier domains is a mere side-effect or whether there are grammatical partition processes that make parochial/parasitical use of these pragmatic notions. The null hypothesis is that it is a mere side-effect.

Apart from maintaining a high degree of autonomy of sentence grammar, the pragmatic story has other conceptual advantages. Rooth (1994) points out that in a theory that allows grammar to make reference to pragmatic notions, nothing would prevent us from defining an verb like *tell** occurring in configurations like *[NP [tell* S]]* with the interpretation 'NP told the focus of S that S', so that for instance 'I told* [MARY likes Bill]' is equivalent to 'I told Mary that Mary likes Bill', while 'I told* [Mary likes BILL]' is equivalent to 'I told Bill that Mary likes Bill'. Clearly, a theory with this power is undesirable. Furthermore, the pragmatic account will lead to an explanation of which constructions are focus-sensitive. The idea is that only elements that are

¹⁸Already in his dissertation, Rooth expressed the position that association-with-focus should be a theorem instead of having to be specified in a rule. In the tradition of Prague pragmatics, there is a similar perspective. Partee, Hajicova & Sgall (1995) write "The interaction of TFA with focus-sensitive operators is held to be a derivative matter, and the properties of such interaction should follow from (a) general properties of TFA, and (b) specific properties of the focalizers in question". It seems to me that Rooth (1992) contains at least the seeds of what I develop here. See Schwarzschild (1993) for similar argumentation. See also Taglicht (1984), Vallduví (1992), Dryer (1994), and Blok (1993) for kindred views.

discourse-dependent in the same way as focus will be able to indirectly interact with focus. The pragmatic anaphora story thus provides an explanation for why focus constrains the interpretation of quantifiers, a very desirable consequence.

So, the pragmatic account has several conceptual advantages. If it turns out that there are no arguments against it, it should be adopted as the null hypothesis. But, how could we even argue against such a vague analysis? Isn't its wishy-washiness an obstacle to any attempt at falsification?

The Falsifiability of the Pragmatic Account. No matter how frustrated one is with the wishy-washy nature¹⁹ of the pragmatic account, it is in fact possible to argue against it on the basis of hard and fast facts. If we can find examples where the identification of the quantifier domain is crucially constrained by the internal grammatical organization of the sentence, we then will know that there is more than pragmatics at work. It is the close look at potential examples of such a kind that the pragmatic account urges us towards. So, the natural project is to look at examples and see whether the identification of the quantifier domain is as contextually variable as the pragmatic account would have it or whether it is put into a grammatical straightjacket. Whatever the outcome, we will have made progress in the search for principles of Universal Grammar. The pragmatic story, while wishy-washy by nature, is highly falsifiable.

Let us now look at the apparent effects of semantic partition and see how the pragmatic account that I have sketched here can explain what's going on. Here's what we're going to look at: (i) the interaction of focus with adverbs of quantification, (ii) the analysis of non-focal indefinites, (iii) the interaction of topic-marking with adverbs of quantification.

4. FOCUS AND QUANTIFICATION

Consider our old friend:

(14) Tai always eats with chopsticks.

If you pay attention to the prosodic structure of this sentence, you will notice that there is likely to be focus on the chopsticks:

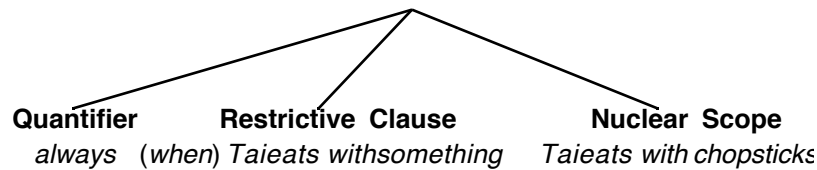
(33) Tai always eats with [CHOPsticks]F.

I mark focus by an []F bracket. Capitalization is used to mark pitch accent. I will not make any assumptions about the relation between pitch accent and F-marking, a problem known as *focus projection*. For a recent survey and discussion, see Selkirk (1993). A proponent of semantic

¹⁹Roger Schwarzschild (p.c.) asks "Do we complain that the semantics of pronouns is wishy-washy because it relies on a notion of salience?".

partition will see the following mechanism at work here. The unfocussed material makes up the quantifier restriction, perhaps according to this algorithm: (i) take the sentence without the adverb, (ii) replace the focussed constituent with an existential quantifier, (iii) take the result as the restrictive clause, (iv) take the original sentence as the nuclear scope. We would get this logical form:

(34)



That focus helps in the identification of restrictive clauses has been noticed by several people: Rooth (1985, 1995), Schubert & Pelletier (1987, 1989), Krifka (1992a&b). Some of the classic examples go like this:

- (35) a. In Saint Petersburg, officers always escorted [ballerinas]_F.
 b. In Saint Petersburg, [Officers]_F always escorted ballerinas.

- (36) Leopards usually attack monkeys in [TREES]_F.

The claim in (35a) is that whenever officers escorted someone in Saint Petersburg it was ballerinas that they escorted. In (35b) on the other hand, it is claimed that whenever someone escorted ballerinas in Saint Petersburg it was officers that escorted them. It is easy to imagine a scenario in which one is true while the other is false. Imagine that ballerinas were very popular in Saint Petersburg and were regularly escorted by many influential men. Then, (35a) might be true while (35b) could be false. Similarly, the domain of quantification in (36) appears determined by the focus on *trees*. The claim is that most situations in which leopards attack monkeys are such that the attack takes place in a tree (or that the monkeys are in trees?). The sentences in (35) and (36) all involve bare plural indefinites, a configuration that will be discussed later on. Here they are just presented as further evidence that focus influences quantifier domains.

In this section, I will first sketch the pragmatic story about the interaction of focus with adverbial quantifiers (building on Rooth 1992b). Then we will look for examples that could falsify the analysis. In the end, the analysis will survive bruised but not beaten.

The Pragmatic Analysis. The idea of the pragmatic analysis is roughly that focus indicates the existence of an implicit question in the context. And it is this question that provides the restriction of the adverb. The focus in (33), for example, indicates that there is a question “How does Tai eat?” in the context. Hence there will be a set of situations in which Tai eats with something. That set can be chosen as the domain of the adverb. How does focus signal the presence of an implicit question? Rooth (1985) proposed an alternative semantics for focus:

focus on a constituent evokes a set of alternatives to that constituent. Focus on *Mary* in *[Mary]_F likes Sue* evokes a set of alternatives to *Mary*. On a higher level, there is an evoked set of alternative propositions that are all of the form ‘*x* likes Sue’.²⁰ The next step will be to see what uses this focus semantic value is put to. Rooth (1992) argues that behind the bewildering array of uses of focus lies one simple mechanism. At some stage in the derivation, the focus semantic value is used to introduce into the context an anaphoric element that will be on a quest to find an antecedent/licenser. The various focus-related effects come from where and when an antecedent is found. Consider question-answer pairs:

- (37) A: Who cut Bill down to size?
B: *[Mary]_F cut Bill down to size.*

The answer will have the following logical form:

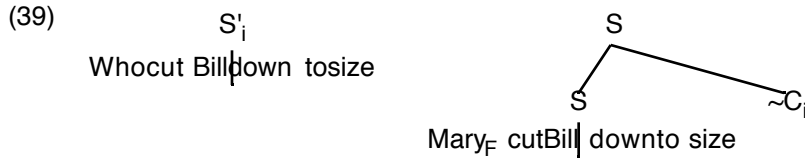
- (38)
-
- $$\begin{array}{c}
 S \\
 \swarrow \quad \searrow \\
 S \qquad \sim C \\
 \text{Mary}_F \text{ cut Bill down to size}
 \end{array}$$

The operator \sim adjoined to *S* introduces a variable *C* whose interpretation is constrained to be a subset of the focus semantic value of *S*, containing at least the ordinary value of *S* and one element distinct from that.²¹ In other words, there is now an anaphor searching for an antecedent, which is constrained to be a subset of the set of propositions of the form ‘*x* cut Bill down to size’. Anaphors need to be licensed. The sentence with focus on *Mary* can only be uttered in a context that has previously evoked alternatives of the form ‘*x* cut Bill down to size’.

It is clear that in (37) the focus structure of the answer is licensed by the question it answers. We have seen earlier how questions are interpreted. The semantic value of ‘Who cut Bill down to size’ is the set of propositions of the form ‘*x* cut Bill down to size’. This is now indeed the right kind of antecedent for the focus anaphor *C* introduced by the \sim operator. We end up with the following representation of the question-answer pair where the anaphoric link is made explicit by co-indexing:

²⁰This way of informally characterizing the set of alternatives (taken straight from Rooth’s work) should not be interpreted to suggest that propositions are anything other than sets of possible worlds/situations. What we really mean is that the set of alternatives is $\{p: \exists x (p = [[\text{likes Sue}]](x))\}$. I will continue to use Rooth’s intuitive phrasing. There are various possibilities of how to compute the focus semantic value, cf. von Stechow (1991) and Kratzer (1991b) for discussion.

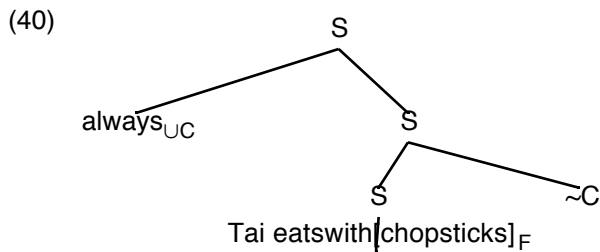
²¹There are interesting, and probably very important, questions about the status of this \sim operator. What are the possible adjunction sites? Is it a functional head? Etc. At this point, I have nothing to say about these issues. Rooth (1992) also remains silent. Let us assume that $\sim\Gamma$ is freely adjoined and freely indexed, with other principles constraining the freedom, as usual. It may be that only certain types of constituents have discourse alternatives (entities, properties, propositions), with higher types excluded.



Now, consider again our example:

(33) Tai always eats with [CHOPsticks]_F.

Note again that the domain of the adverb is a set of situations while the focus anaphor is a set of propositions, that is a set of sets of situations. The way to get around this obstacle is to give the adverb as its argument the set-theoretic union of the set of propositions. This corresponds to existential quantification over the set of substitution instances. The logical form for our example will look like this:



The focus anaphor C is constrained to be a subset of the set of propositions of the form ‘Tai eats with x ’. The domain argument of *always*, or rather a part of it, is identified with C . The union of the set of propositions is taken and we get a set of situations in which Tai eats with something. The sentence then asserts that all of these situations are also situations in which Tai eats with chopsticks.

The crucial fact is that the quantifier domain itself also has anaphoric character. The chain of anaphoric dependencies is not a two-way relation between the focus anaphor and the quantifier domain. Note that both the focus anaphor and the quantifier domain, while now co-indexed, need to be further specified. Linking two anaphoric elements does not relieve them of their anaphoric nature and the requirement of finding an appropriate antecedent, cf. a sentence like *He_j likes himself_i*. In fact, Rooth hints at this issue: “Focus need not be the only source of information about C , though. At a formal level, C remains a free variable, which is viewed as an indication that its value is to be fixed pragmatically” (Rooth 1992: 89f). The ultimate antecedent, I submit, is the discourse topic, an explicit or implicit question.

The pragmatic story thus makes the immediate prediction that examples where focus influences a quantifier domain need to be situated in a rich context that contains the presupposed discourse topic:²²

(41) Kim usually [WALKS]_F to school.

This sentence is not felicitous in a null context. We need to be discussing how Kim gets to school. Another way to demonstrate this point comes from experiments where the association-with-focus sentence is put in a context that does not supply the right kind of antecedent for the focus anaphor. Consider an example:

(42) Q: How does Tai eat?
A: #Tai always [EATS]_F with chopsticks.

Now, A should just mean that whenever Tai does something with chopsticks she eats with them. This is a somewhat oblique reply to the question, but it should nevertheless be acceptable since it in fact at least partly answers the question. Nevertheless, A is anomalous. This failure of defusion is for us a reflection of the fact that the quantifier domain is presupposed to be a familiar global discourse referent. If there is none such in the discourse the utterance will be infelicitous. A presupposes that there is an implicit question “What does Tai do with chopsticks?”, but there isn’t, so the answer is out of place. But note that one could answer: “I don’t really know. But whenever there are chopsticks around, she in fact EATS with them and doesn’t do anything else with them.”

The semantic account can be modified to also make this prediction: (i) all foci have to be associated with an assertion operator on top, or (ii) quantifier domains are subject to a familiarity presupposition (suggested as a solution by de Swart 1995). If the latter view is taken, the semantic account has admitted that there are discourse objects corresponding to quantifier domains, which means that the burden of proof has shifted even further. Not surprisingly, the theory with more machinery can accommodate lots of facts. But it does this by incorporating notions from the pragmatic analysis.

Trying to Falsify the Pragmatic Analysis. At this point, the pragmatic story looks good. It explains the natural interpretation of *Tai always eats with [CHOPsticks]_F* without using a grammatical procedure that makes reference to F-marking. We saw earlier that such a story is conceptually preferred. We also saw that it is falsifiable. The pragmatic story makes a falsifiable prediction: in a sufficiently rich context, a focussed phrase does not need to end up as part of the nuclear scope of the adverbial quantifier. The story will be falsified if even in a sufficiently rich context, focus strictly determines the quantifier domain. Let us look for relevant examples.

²²Here I was helped by the arguments in Schwarzschild (1993).

The pragmatic analysis predicts that there are cases where a focus-marked phrase does not in fact restrict the quantifier. The focus-marking is licensed by something other than the quantifier domain. And the quantifier domain is identified by something other than the focus structure of the nuclear scope. Here is one example that shows that if there is a licensing discourse topic around, focus need not constrain the domain of the adverb:

- (43) A: So, you say that Tai is really fond of chopsticks, eh?
 B: Not really. I only think that he always [EATS] with them.

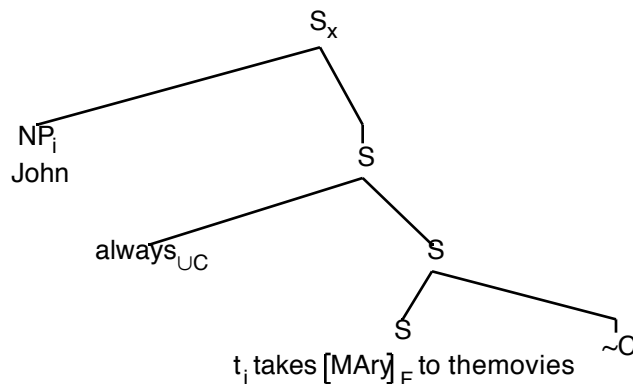
B’s response is naturally interpreted as “I only think that always, when John eats with something, he eats with chopsticks”. The focus on *eats* does not contribute to the identification of the quantifier domain. This is exactly the kind of example the pragmatic analysis predicts should exist. And it does exist. There is of course a big question here: how is the quantifier domain (situations where John eats with something) determined? I have no clue. This is where we get bruised: the pragmatic story as such doesn’t help us much here. It just says the hearer somehow figures out what is meant: clearly a rather disappointing “analysis”. On the other hand, I don’t see that a semantic partition analysis will have anything much better to say here.

There are examples that are very similar but in which it is a little clearer where the quantifier domain comes from: examples where the domain of the adverb was established in a previous sentence. I will discuss a series of such examples. There is one kind where it is fairly easy to claim that the main focus is not in the scope of the adverb:²³

- (44) A: John always takes [MAry]_F to the movies.
 B: No. [PEter]_F always takes Mary to the movies.

A possible LF representation for (44) is this:

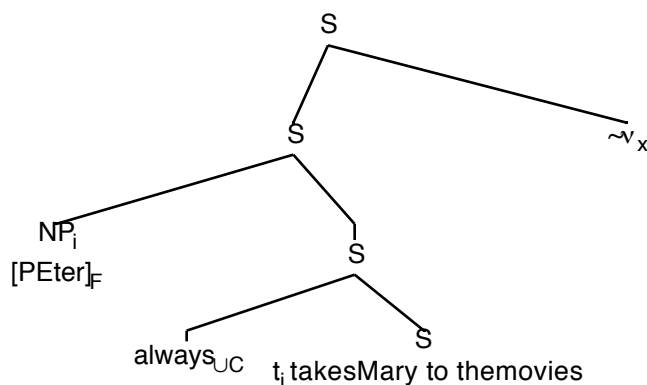
- (45) A:



John is an x such that always (x takes s.o. to the movies) (x takes Mary to the movies)

²³Such examples have been discussed in various places, see Partee (1991), who cites Gussenhoven (1984). Jackendoff (1972: 257) notes such examples for negation but claims, apparently incorrectly, that this situation never arises with *only* or *even*.

B:



Peter is an x such that always (x takes s.o. to the movies) (x takes Mary to the movies)

What happens in (45) is that the first sentence works as usual (except that we have applied optional QR in the LF given here). The sentence states that John is such that he always takes Mary and not anyone else to the movies. The second sentence has *always* be restricted by the same domain as in the first sentence. The contrastive focus on *Peter* is licensed by contrast with the first sentence. We might want to use (44) to show that the pragmatic account has a leg up on the semantic account. The reason is that the domain of the adverb in the second sentence clearly seems to be anaphoric to the adverb in the first sentence. And if that is how the domain of the second adverb is determined, we have admitted that the domains of adverbs can be determined entirely through discourse effects. However, the semantic account might say that there is some kind of residual focus on the appropriate constituent, on *Mary* in (44), and that the domain of the adverb can then be computed locally as usual. Such a move, which is contemplated by Partee (1991) and by Rooth (1992), would find some support from an observation by Susanne Tunstall (p.c.):

- (46) A: John always takes [MAry]_F to the movies.
 B: No. ??[PEter]_F always takes her to the movies.

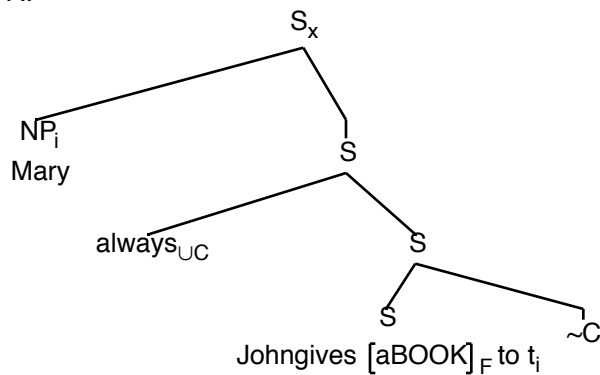
If the constituent that was focused in the initial utterance is replaced by a pronoun in the target sentence, the sequence becomes odd. This may be taken to indicate that some kind of F-marking on the constituent is present which is incompatible with anaphoric reduction. (Schwarzschild (1993) seems to suggest that there is no such residual focus here, in fact that there can't be according to his minimality account. I am not so confident, partly because of Tunstall's observation.) If we don't posit F-marking on the second occurrence of *Mary*, then the semantic account has to be modified in such a way that it allows there to be no focus in the scope of the adverb. In that case, the adverb must be allowed to receive its domain from the context. We might say that puts the semantic account on the slippery slope towards the pragmatic account.

Note that even our account crucially depends on the subject in these examples being higher than the adverb. Otherwise, we couldn't identify the domains of the two adverbs. That means that even our account seems to depend on syntactic facts about the example. There are now examples that show that we need fairly unsavory syntactic manipulations to line up the examples in a suitable manner. Dryer (1994) attacks the standard theories of focus based on such examples:

- (47) A: I hear that John always gives [a BOOK]_F to Mary.
 B: True, but he always gives a book to [MAny people]_F.

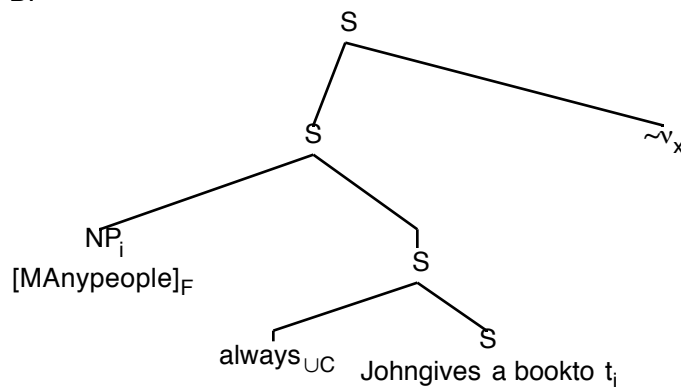
What happens here is that the domain of *always* is established in the first utterance and the second utterance contains a contrastive focus, which is in the surface scope of *always* but fails to associate with it. Here again, we have to say that LF-movement has to apply to untangle the structure in a way such that the domain of *always* can be the same in both sentences (Dryer does not seem to realize the necessity for such disentangling).

- (48) A:



Mary is an x such that always (John gives sth to x) (John gives a book to x)

- B:



Many people are an x such that always (John gives sth to x) (John gives a book to x)

Rooth (1994) now constructs examples where the second focus is embedded in an island. In these cases, we are forced to posit movement of the second focus out of the scope of the adverb, but this movement violates island constraints:

- (49) John always gives [a BOOK]_F to Mary's mother.
 No. John always gives a book to KIM's mother.
 Yes. And he also always gives a book to KIM's mother.

Kim is an x such that always (John gives sth to x's mother) (John gives a book to x's mother)

Here we need to move out of a leftbranch specifier. Other cases can presumably be constructed.

Another problematic case:

- (50) Emma is a very happy baby.
 She always [SMILES]_F at us.
 She usually even smiles [at VISitors]_F

Even visitors are x such that always (Emma sees x) (Emma smiles at x)

Here what we would have to move is the non-constituent *even (at) visitors*.

And lastly, Rooth (1992) already discussed this example:

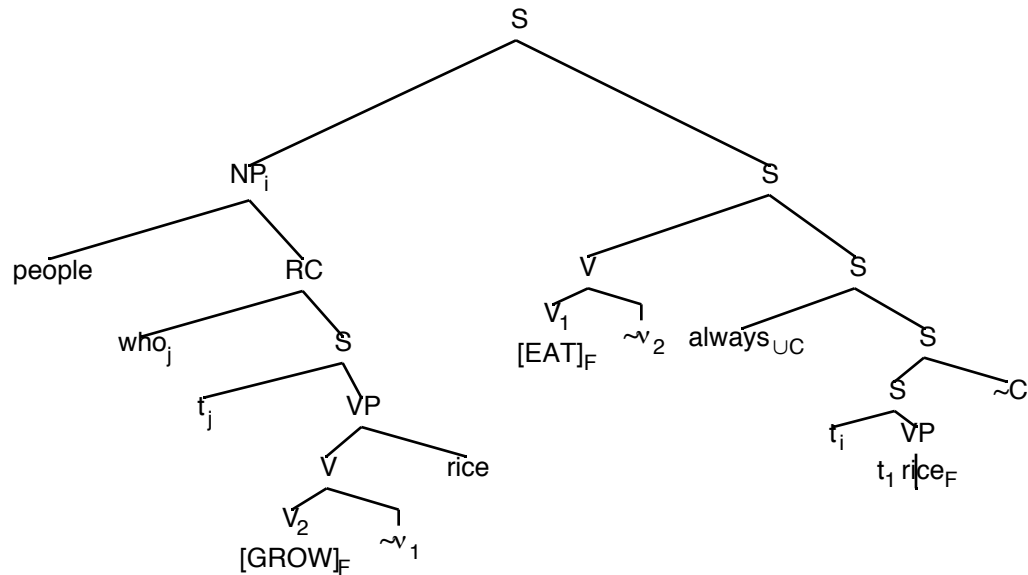
- (51) People who [GROW]_F rice always [EAT]_F rice.

The sentence means that people who grow rice don't eat anything other than rice. Intuitively, the two verbs are focused because they are mutually contrastive. The domain of *always* however are propositions of the form 'x eats y'. The question is how the domain is determined here. Again, we might be able to argue that there is some almost undetectable focus on *rice* here, supported by Tunstall's test:

- (52) ?? People who [GROW]_F rice always [EAT]_F it.

If this is correct, then we would have to give an LF for the example where the focused verb is scoped away from under *always*, which allows us to compute the domain of *always* locally:

(53)



Again, the movement posited here is rather dubious.

Such examples then are a problem under both the pragmatic and the semantic account. The semantic account has no choice but to use non-standard syntactic operations. The pragmatic account has to use the same operations if we want to claim that the domain of the adverbs are identical in the two relevant examples. The alternative would be to have the domain of the adverb determined in some other way by the pragmatics. Then, there would be no reason to use funny syntactic movements. We can conclude that the pragmatic account survives bruised but alive. We will now continue to look for counterexamples, in which the quantifier domain is automatically determined without the predicted contextual variability.

5. QUANTIFICATIONAL VARIABILITY

In this section, we will look at cases where an adverbial quantifier applies to a sentence that contains an indefinite NP. Before we can see whether the pragmatic story can deal with the data in this area, we actually need to establish the empirical adequacy of the other prong of our minimal theory. Can a situation-based semantics deal with quantification over indefinites?

Quantificational Variability in a Situation-Based Semantics. First, note that when an indefinite is part of the focus, we expect no special effects on the intended quantifier domain:

(54) John $always_C$ [wears a HAT] $_F$.

Our analysis predicts that this sentence means that in all of the relevant C-situations, John wears a hat. There is not much information about C, and that seems right. Things become challenging, however, when the indefinite is not part of the focus. It may seem unlikely that an indefinite

phrase could be part of the background: after all, we tend to use definites and not indefinites for referring to familiar material. But in fact, such sentences have become the bread and butter of current semantic research. It has been observed that when an indefinite is not part of the focus, it does not appear to have existential force but takes on the quantificational force of whatever higher operator there is. This has been called the “quantificational variability effect” (QVE) and can be illustrated by this example:

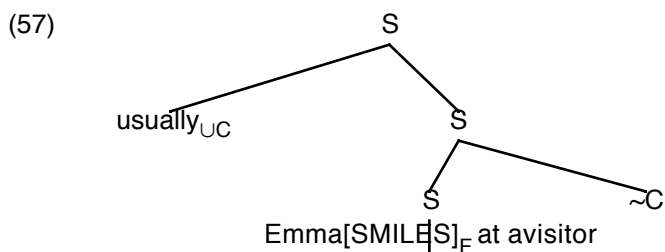
- (55)
- a. A blue-eyed bear is $\left\{ \begin{array}{c} \text{always} \\ \text{usually} \\ \text{often} \\ \text{sometimes} \\ \text{seldom} \\ \text{never} \end{array} \right\}$ intelligent.
- b. $\left\{ \begin{array}{c} \text{All} \\ \text{Most} \\ \text{Many} \\ \text{Some} \\ \text{Few} \\ \text{No} \end{array} \right\}$ blue-eyed bears are intelligent.

Intuitively, the examples in (55a) can be paraphrased with the determiner-quantified sentences in (55b). The mystery is how these equivalences are derived. The classic Lewis-Kamp-Heim analysis says this: the adverb of quantification quantifies over the variable supplied by the indefinite. The indefinite is not an existential quantifier, instead it merely supplies a variable, a restricted free variable. In our situation-semantic account, we have to derive the QVE in a different manner. Indefinites are always existential quantifiers for us. One can see that we might get something like: “All/Most/Many/Some/Few/No minimal situations in which there is a blue-eyed bear are part of a situation in which that bear is intelligent”. We will first discuss what exactly we can get out of our semantics for such sentences. Then we will talk about whether this analysis is really adequate.

Let us take the following example:

- (56) Emma usually [SMILES]_F at a visitor.

Our theory will yield this LF:



Our semantics now gives this interpretation:

- (58) Most minimal situations in which there is a visitor such that Emma does something at her are part of a situation in which there is a visitor such that Emma smiles at her.

This may superficially look promising, but it immediately raises the problem of “requantification”.²⁴ The non-focussed existential quantifier *a visitor* will be interpreted twice. Note the double occurrence of “there is a visitor...” in the paraphrase in (58). There is no guarantee that we are talking about the same visitor. In fact, any visitor will contribute to the truth of (58) as long as we can find one visitor that Emma smiles at. This not good. What we need is a relation between the visitor-situations quantified over and the Emma-smiling-at-visitor situations that is stronger than the mere part-of relation. The visitors which are not smiled at by Emma constitute situations which are part of a larger situation where there is a visitor smiled at by Emma. But note that they are not part of a minimal situation in which Emma smiles at a visitor. In fact, they are irrelevant parts of any situation in which Emma smiles at a visitor. What we want to ensure is that the verifying instances are minimally extendable into situations of a visitor smiled at by Emma. This suggests the following revision of our semantics for adverbial quantifiers:

$$(59) \quad \llbracket \delta_C \checkmark q \rrbracket = \left\{ s: \llbracket \delta \rrbracket \left\langle \min(C(s)), \left\{ s': \exists s'' (s' \leq s'' \& s'' \in \min(\llbracket q \rrbracket^{s'/r})) \right\} \right\rangle \right\}$$

That means that the statement is true in a situation s iff δ -many of the minimal situations in the contextual domain C are part of a minimal q -situation. We have now removed the irrelevant visitors. Unfortunately, this trick creates a problem when we look at cases where there is a *when*-clause supplying an explicit restriction for the adverb:

- (60) When Emma enters a room, she usually smiles at us.

Emma’s entering the room presumably cannot be part of a minimal situation in which she smiles at us. But the sentence should have a chance of being true. What we need to do now is to build in conservativity (as pointed out to me by Irene Heim and Angelika Kratzer):

$$(61) \quad \llbracket \delta_C \checkmark q \rrbracket = \left\{ s: \llbracket \delta \rrbracket \left\langle \min(C(s)), \left\{ s': \exists s'' (s' \leq s'' \& s'' \in \min(C \cap \llbracket q \rrbracket^{s'/r})) \right\} \right\rangle \right\}$$

The minimal C -situations have to be part of a minimal $C \& q$ -situation.

²⁴This problem was first discussed by Rooth (1995), I believe.

With the revision proposed in (61), we have solved the problem of requantification. In essence, we have circumvented the novelty condition in cases where the indefinite is interpreted twice because of manipulations in the semantics. On the syntactic level, novelty should of course still hold:

(62) Always, if a cat is hungry, a cat cries.

If we just blindly apply our semantics to this sentence, we would predict coreference between the two occurrences of *a cat*: we would predict that (62) means something like “all hungry cats cry”. That is not what we want. So, there is still a need for a novelty condition.²⁵

The minimality trick has other consequences. Consider:

(63) John always takes [MAry]_F to the movies.

This is often taken to imply that John always takes only Mary to the movies, the so-called “exhaustive listing” reading. In fact, our semantics as amended in (61) directly predicts the exhaustive reading. The reading we get is “All minimal situations in which John takes someone to the movies are part of a minimal situation in which John takes Mary to the movies”. Now, assume that there was a night on which John took not only Mary but also Kim. Note that the minimal situation in which John took Kim is part of a larger situation in which he took Mary. But, crucially now, the Kim situation is not part of a minimal situation in which John took Mary. Hence, our semantics leads naturally to the exhaustive reading.

Are we now in danger of predicting truth-conditions that are too strong? Is it possible to have non-exhaustive readings of adverbially quantified sentences? Clearly the answer is yes (Roger Schwarzschild made sure I realized this fact). Consider:

(64) John always takes two children to the zoo.
 He almost always takes Bill.
 Twice he took Rina.
 He rarely takes Paul.
 He never takes Mary.

Here all of the sentences (except possibly the first one) are interpreted non-exhaustively. For example, *He rarely takes Paul* does not mean that he rarely takes only Paul and nobody else. That would be particularly strange since the first sentence asserts that he never takes only one child. So, how can we make space for non-exhaustive interpretations? There are two immediately obvious options. (i) We could say that there is an implicit “among others” in the interpretation of

²⁵By the way, there are some exotic denizens of the donkey realm, which violate the novelty condition:

(i) Show me a man who plays hard and I show you a man who deserves a beer.

I actually kind of get a reading like that for (62), but wouldn’t want to make too much out of that intuition. We also find donkey sentences with two pronouns violating the familiarity condition:

(ii) If it’s out there, it’s in here. (Nynex Yellow Pages slogan)

the nuclear scope. I have serious qualms about using that way out. (ii) We could say that the restriction is interpreted to consist of minimal situations in which a group is involved. I lean towards this second solution, but won't go into the issue any further.

So much for the technical discussion of how the situation-semantic analysis deals with adverbs and indefinites. Let us now consider whether this is an adequate treatment of the QVE. We will look at a number of different kinds of examples. Take first again:

(56) Emma usually [SMILES]_F a visitor.

Again, what we say this means is: "Most minimal situations in which Emma does something to a visitor are part of a minimal situation where Emma smiles at a visitor". We might now think that this is in fact a better analysis than an analysis that makes (56) equivalent to a quantification over visitors:

(65) Emma smiles at most visitors.

Consider the possibility that Emma smiles at the three most frequent visitors but is rather cool to most infrequent visitors. Then, conceivably we might judge (56) to be true while judging (65) to be false. A proponent of the unselective binding approach might answer by stipulating that whenever there is a situation/time/event variable present, an adverb has to bind that variable. That means that (56) would be analyzed as "most situation *s* and visitors *v* are such that Emma smiles at *v* in *s*". And they might point out that (65) does in fact also have reading where it quantifies over visiting situations; this is known as the event-related reading of nominal quantifiers (Krifka 1990). We probably have a push between the two analyses.

Here is a similar example:

(66) I always [write UP]_F a witty story about Millard Fillmore.

Diesing (1992: 105, (25)) discusses (66) and gives this representation:

(67) always_x [*x* is a story about Millard Fillmore] I write up *x*

We might object, as we did above, that (67) is in fact not the right interpretation, since (66) does not mean that every story about Millard Fillmore is such that I write it up. Instead, (66) quantifies over situations involving me and a story about Millard Fillmore. Diesing in fact gives the following paraphrase for the QVE reading:

(68) Whenever I hear a witty story about Millard Fillmore, I always write it up.

She does feel then that (66) quantifies over situations. As suggested above, we could amend the unselective binding approach by requiring it to always at least quantify over situations.

Cases that look tougher have “individual-level” predicates:

- (69) Usually, a blue-eyed bear is intelligent.
 Usually, a quadratic equation has two solutions.

Here there is no clear intuition that we are quantifying over situations. But it may be possible to make these compatible with our approach. We could try to resurrect an analysis considered and rejected by Lewis. Perhaps, (69) quantifies over situations where we are encountering or sampling blue-eyed bears or quadratic equations. There is relevant discussion in Schubert & Pelletier (1989), who also give other references. So, it looks like we can maintain the situation-based approach.

There are at least two further issues that would deserve closer attention:

(i) There is a clear difference between “weak” indefinites (singular *a*-phrases and bare plurals) and “strong” indefinites. Only the former show the QVE:

- (70) a. A bear always likes honey.
 b. Some bear always likes honey.

In our theory, it seems we would not expect this difference since we treat all indefinites as existential quantifiers. The solution I would suggest (based on ideas of Angelika Kratzer) is that “strong” indefinites are inherently partitive and require that the situation contains all relevant individuals satisfying the restriction of the indefinite. (70b) thus must quantify over largish situations, each of which contains all relevant bears. The QVE will not arise because it is a side-effect of quantifying over very small situations containing only one bear each.

(ii) It has been noted that the contextual restriction of adverbial quantifiers cannot be “static”. Krifka (1987) and Croft (1986), notes that adverbial quantifiers and generic sentences resist contextual narrowing to a salient set of entities:

- (71) There are lions and tigers in the cage.
 a. Every lion has a mane.
 b. A lion always has a mane.

The crucial observation is that while (71a) can be read as quantifying over the lions in the cage, this is impossible with the adverbial quantification in (71b). Why should this be if the two sentences get virtually identical LFs? From the perspective of the situation-based approach, we can say this: the salient set of lions in the cage do not constitute a salient set of situations that could contextually restrict the adverb. Note that adverbs can of course be contextually restricted, in fact that is the major point of this paper, but the restriction has to be “situation-like”. An observation attributed to Regine Eckardt by Kamp & Partee (1994) seems to be another instance of this fact:

- (72) a. Ameisen sind oft in diesem Ameisenhaufen.
 ‘Ants are often in this ant hill’.
- b. Viele Ameisen sind in diesem Ameisenhaufen.
 ‘Many ants are in this ant hill’.

As another illustration:

- (73) What do you do when animals have very complicated injuries?
 Pets I usually try to rescue at any cost. Livestock we destroy.

These facts about what kind of contextual restrictions adverbs allow may in the end turn out to be strong arguments for the situation-based approach. Condoravdi (1994: 73) claims that “generic statements do not accept implicit contextual restrictions”. But that is clearly too strong.

So much for justifying the situation-semantic analysis of quantificational variability. More could and should be said. But we now turn to the question of whether there are counterexamples to the pragmatic story from this area.

Obligatory Restrictions? Again, the kind of example that would falsify the pragmatic account would look like this: there is a kind of topic/focus marking on a constituent and even in a sufficiently rich context the only reading available is the one predicted by semantic partition. The pragmatic account would lead us to expect that clever manipulations of context could bring out a previously hidden ambiguity. If we can’t do that, we have evidence for the grammatical account.

The first kind of example we consider is essentially of the same nature as the ones discussed in the previous section:

- (74) a. Tai isn’t overly fond of forks. It’s just that he always [EATS]_F with a fork.
 b. Look. I only said that [BEARS]_F are usually intelligent, not ALL carnivores.

These show that in a sufficiently rich context, the quantifier domain can be established independently of the focus-marking in the sentence. In (74a), the focus on *eats* is motivated by contrast with other relations to forks, while the quantifier domain is given by situations in which Tai eats with some instrument. The semantic account would have to posit hidden F-marking on *a fork* and move the focus on *eats* out of the way of the adverb. In (74b), the focus on the bare plural indefinite is motivated by contrast but does not prevent the indefinite to effect the quantifier domain: we are quantifying over bears (minimal bear-situations). In sum, the sentences in (74) show the expected independence of the meaning of focus and the determination of quantifier domains. No obvious falsification of the pragmatic account then.

At last, we encounter the Boojum, a type of example that truly threatens the pragmatic analysis. Will our analysis softly and suddenly vanish away, and never be met with again? We’ll see. The

relevant cases form the core of Diesing's analysis (Diesing 1990, 1992). She shows that subjects of individual-level predicates, objects of certain verbs, and German scrambled phrases obligatorily restrict adverbial quantifiers in their clause. Her analysis is that all three kinds of noun phrases are external to the VP at LF and are then subject to a mapping operations that interprets all and only VP-external constituents as part of the restrictive clause. Here are some relevant examples:

- (75) Usually, a faculty member is intelligent.
- (76) Usually, John dislikes a vampire movie.
- (77) ...weil Otto ein Buch über Wombats gewöhnlich liest
b/c Otto a book about wombats usually reads
 'Usually, when Otto encounters a book about wombats, he reads it.'

All of these only have an interpretation where the indefinite is part of the restriction of the adverbial quantifier. This becomes even clearer if we consider minimally different examples:

- (78) a. Usually, [a FAculty member]_F supervises Linguistics 101.
 b. Usually, [a FAculty member]_F is intelligent.
 c. Usually it's [a FAculty member]_F who is intelligent.

Even with focus on the indefinite as in (78b), we do not get a reading where the indefinite is part of the nuclear scope of *usually*. Such a reading is obviously available and even preferred for (78a), a sentence with what might be taken to be a stage-level predicate. We can force the desired reading by using a cleft structure as in (78c), but it seems that (78b) can never be read as synonymous with (78c). Next:

- (79) a. Usually, John dislikes a vampire movie.
 b. Usually, John complains [about a VAMpire movie]_F.
 c. Usually it's a vampire movie that John dislikes.

With the experiencer verb *dislike*, we also get an unambiguous interpretation. The adverb quantifies over vampire movie situations. (79a) cannot mean what (79c) means. With a different verb as in (79b), we get a reading "Usually when John complains about something, John complains about a vampire movie". Next:

- (80) a. ...weil Otto ein Buch über Wombats gewöhnlich liest
b/c Otto a book about wombats usually reads
 'Usually, when Otto encounters a book about wombats, he reads it.'
- b. ...weil Otto gewöhnlich ein Buch über Wombats liest.
b/c Otto usually a book about wombats reads
 'Usually (when I see him) Otto is reading a book about wombats.'

The scrambled object in (80a) is unambiguously read as restricting the adverb. The unscrambled object in (80b) is read as part of the nuclear scope of the adverb.²⁶

Diesing very successfully links all three phenomena through her mapping hypothesis. VP-external material must restrict the local quantifier. Subjects of individual-level predicates and objects of certain verbs must vacate the VP by LF (in German often as early as s-structure). Scrambled material is obviously VP-external. These data then are significant challenges to my project of avoiding partition proposals. Can we come up with an alternative that works more indirectly?

Topic Anaphors. The intuition I want to pursue is this: VP-external material is interpreted as topical. It is the topic status that indirectly makes the VP-external phrases work as quantifier restrictions.²⁷ Why should topics restrict quantifiers?²⁸ We might be tempted to say is that it is not in fact the property of being a topic that is crucial here but the property of not being in focus. Movement out of VP is just a way of escaping focus-marking. And the lexical facts about individual-level predicates and so on are such that they demand certain arguments to not be in focus. (OR, they demand VP-external position somehow). And then we could just use whatever we have about focus and quantifiers. I think, however, there is reason to think that there is more at work here. Most prominently, recall this example:

(81) Look. I only said that [BEARS]_F are usually intelligent, not ALL carnivores.

Here, there is focus on the subject of an individual-level predicate. So, it can't be that it all somehow reduces to focus.

My idea is simple: topics are anaphoric in nature. Topics tell us about the context. Indirectly, they tell us about the domain of quantifiers. To simplify matters, I will just talk about topical indefinites here. Topic-marking on an indefinite triggers a presupposition. If *a bear* is topic-marked we presuppose that there is contextually salient set of situations, in each of which there

²⁶There are configurations where non-scrambled objects can still restrict the adverb. The important generalization is that if the object is scrambled it has to restrict the adverb.

²⁷For the lexically governed cases, we might have to say that the relevant phrases are topic-marked coming from the lexicon. Note that individual-level predicates cannot be used in so-calledthetic sentence or all-new sentences (references?):

(i) Look! Shoes are on sale.
#Look! Shoes are expensive.

exists a bear. It is that set floating in the context which can contribute indirectly to the determination of a quantifier domain:²⁹

(82) Topic-Marking:

[a CN]_T presupposes the familiarity of a set of situations in which there is a CN.

In simple contexts then, we expect an adverb to pick up that very same set of situations as its domain. Before we face the problem raised by the lack of ambiguity in Diesing's examples, let me present one big argument in favor of the pragmatic analysis.

Long-Distance Effects of Topic-Marking. There are cases where topical indefinites restrict non-local quantifiers. One such case, which I have discussed in various places before (von Fintel 1992ab, 1994), comes from indefinites in *unless*-clauses. Note first that negation counts as an operator interacting with indefinites:

- (83) a. #If there isn't a donkey in the backyard, we usually feed it.
b. If a donkey isn't in the backyard, we usually feed it.

The indefinite in (83a) is "roofed", so to speak, by the negation and cannot be captured by the adverb *usually* and hence cannot antecede the donkey pronoun. For the moment it is immaterial exactly which theory of donkey sentences we adopt. The indefinite in (83b) on the other hand is outside the scope of negation and hence becomes part of the quantifier domain. So far so good. Now, look at this:

- (84) a. #Unless there is a donkey in the backyard, we usually feed it.
b. Unless a donkey is [in the BACKyard]_F, we usually feed it.

This contrast is highly reminiscent of the one in (83), but there is an important difference. The indefinite in (84b) is still within the scope of the negative operator (in this case *unless*), but it can apparently restrict the quantifier. We can put even more distance between the indefinite and the operator it restricts (these examples were suggested to me by Angelika Kratzer):³⁰

- (85) a. Unless I am absolutely sure that I OWN a donkey, I never beat it.
b. Unless I know the person who OWNS a donkey, I never beat it.
c. Unless I am wondering whether I might BUY a donkey, I never beat it.

Other examples of this nature have been noticed in the literature but have not received a satisfactory analysis. Rooth (1995) has examples like these:

²⁸Chierchia (1990, 1992) just stipulates this. But we would clearly like to go further.

²⁹There is of course plenty of literature on the interpretation of topics (Dahl 1974; Gundel 1975, 1977; Chafe 1976; Keenan and Schieffelin 1976; Li and Thompson 1976; Prince 1981; Reinhart 1981; Szabolcsi 1981; Ward 1986; Ward and Prince 1991; Vallduví 1992, 1993). In von Fintel (1994), a different interpretation of topic-marking is proposed. For our purposes here, we can use the simpler version proposed in (82). The version in my dissertation has the virtue of linking the notions of discourse topic and sentence topic. For some discussion of the proposal in my dissertation and a comparison with other recent analyses, see McNally (1995).

³⁰By the way, these are also arguments against the focus-based approach. We need topic-marking here.

- (86) a. At least one person an AIDS victim works with is usually misinformed.
 b. When everybody an agent works with trusts him, he is usually a traitor.
 c. Rarely does every critic who reviews a book by Henry Miller like it.

Rooth notes that these examples are problematic both for a syntactic theory (such as Diesing's) and for a purely focus-based account. He also notes that it is perhaps harder to get this reading if the indefinite is in the object position of the relative clause:

- (87) At least one person who works with an AIDS patient is usually misinformed.

I submit that the pragmatic story I have told does cover such examples.³¹ The marginally different nature of (87) can be attributed to the fact that objects are less often topical compared to subjects. But I do think that the reading is available.

That topic status is important here is confirmed by the fact that in German these indefinites have to be locally scrambled:

- (88) a. Nur wenn [ein Esel]_T schon seit langem zu unserem Stall gehört,
only if a donkey already since long to our stable belongs
 lassen wir ihn frei rumlaufen.
let we it freely run around

'Only if a donkey has been in our stable for a long time do we let it run around freely'.

- b. #Nur wenn schon seit langem ein Esel zu unserem Stall gehört,
only if already since long a donkey to our stable belongs
 lassen wir ihn frei rumlaufen.
let we it freely run around

'#Only if there is a donkey that has been in our stable for a long time do we let it run around freely'.

The same non-local effect can be observed with the inherently topic-marked subjects of individual-level predicates:

- (89) a. Unless [a student]_T is very intelligent, we usually don't even consider her for admission.
 b. If there is at least one professor who thinks that [a student]_T is intelligent, we usually consider her for admission.

Note that the indefinite in the *unless*-clause in (89a) does not restrict a generic operator in its local clause. What it does restrict is the domain of *usually*, which is understood as quantifying over student situations (minus the ones where the student is very intelligent). The conclusion I want to draw at this point is that topical indefinites trigger a presupposition about the context. Indirectly, they can therefore restrict quantifier domains. Since there is no direct mechanism of partition at work here, the potentially non-local nature of "association-with-topic" is not a surprise.

³¹Other work on "wide scope indefinites" is relevant: Abusch (1994) and Cresti (1995). Cf. also Tsai (1994) and Percus (1995) on similar problems concerning locality and cyclicity in Diesing's analysis.

What about Diesing's examples? Recall that they showed that topic-marked indefinites obligatorily serve as restrictions (although we need to revise this generalization so as to allow non-local restriction). The purely pragmatic story that we want to defend on the other hand predicts that in the right context even topic-marked phrases should be able to be in the nuclear scope of an adverb.

For German scrambling, I think that there are in fact cases where Diesing's generalization does not hold. Topic-marking by scrambling does not interact obligatorily with quantifier domains:

- (90) a. ... weil wir Habichte selten sehen.
 b/c we hawks seldom see
 ‘rarely (when we go for a walk) do we see hawks’
- b. ... weil er osteuropäische Länder oft besucht.
 b/c he easturopean countries often visits
 ‘often (when he goes on trips) he visits easturopean countries’

These sentences with scrambled objects do have readings where the object does not restrict the quantifier. (90a) has a reading “(when we go for a walk in the woods,) we rarely see hawks”, as long as the topic-marking (scrambling) is motivated by anaphoric links to the preceding context. For example, the hawks could have been mentioned earlier as an endangered species, or they could stand in some relation to some other species that was mentioned (in which case it could be called a contrastive topic). Similarly, (90b), an example due to Roger Schwarzschild (p.c.), can mean “(when he goes on business travels,) he rarely visits easturopean countries”, again as long as the easturopean countries are contextually salient. This optional nature of association-with-topic is what we expect from our pragmatic partition approach.

Things are less easy in the case of lexically marked topics.³² What we would need are examples like this one:

- (91) Usually, when we need an expert on some exotic Australian language, a colleague of Ken Hale's knows it quite well.

The question is whether there is a purely existential reading of *a colleague of Ken Hale's*. To facilitate this, we would consider the sentence in a context where Ken Hale and his many distinguished field-worker colleagues are quite salient (to justify the assumed inherent topic-marking of the subject of know). My intuitions are not very clear at this point.

³²Kiss (1994) presents examples that she sees as counterexamples to Diesing:

- (i) a. GIRLS know mathematics the best in my school.
 b. In this village, only WOMEN have blue eyes.

Intuitively, there may be an existential reading for these examples. However in the absence of a positive theory about what goes on here, we shouldn't be swayed by them. One would need to know more about the superlative construction in (ia) and about *only* in (ib). See von Fintel (1996b) for discussion of *only*.

Diesing's examples with experiencer objects are also less clear when put into a richer context:

- (92) John is a truly ornery guy. Whenever I meet him, he has a new pet peeve. Usually, he dislikes a vampire movie. But yesterday, it was the new book by Grisham.

Intuitions are dubious. There is clearly something special about these verbs. But whether Diesing's generalization holds as strongly as we thought in the beginning is now not so obvious anymore.

There is a possible alternative explanation for why individual-level predicates have a hard time allowing existential readings of indefinites. The most obvious interpretation that would have the indefinite in the nuclear scope of the adverb is one that has the predicate itself in the restriction:

- (93) usually (when someone is intelligent) (a faculty member is intelligent)
usually (when John dislikes something) (John dislikes a vampire movie)

There may be a problem because the restrictive propositions here are imperfective/atelic/stative and hence may not obviously yield a set of minimal situations to quantify over. I am not sure whether this is a promising line of argumentation.

My provisional assessment at this point is that pending closer investigation of inherent topic-marking with individual-level predicates (including experiencer verbs), the pragmatic account is reasonably viable. Given its conceptual advantages, it seems advisable to spend some energy on reconciling it with Diesing's facts.

REFERENCES

- Abusch, Dorit: 1994. "The Scope of Indefinites." *Natural Language Semantics* 2: 83-135.
- Asher, Nicholas: 1995. "From Discourse Macro-Structure to Micro-Structure and Back Again: Discourse Semantics and the Focus/Background Distinction." manuscript. University of Texas at Austin.
- Bach, Emmon: 1981. "On Time, Tense, and Aspect: An Essay in English Metaphysics." In *Radical Pragmatics*, ed. Peter Cole. New York: Academic Press. 63-81.
- Barwise, Jon: 1989. *The Situation in Logic*. Stanford: Center for the Study of Language and Information (CSLI).
- Barwise, Jon and John Perry: 1983. *Situations and Attitudes*. Cambridge, MA: MIT Press.
- Bäuerle, Rainer and Urs Egli: 1985. "Anapher, Nominalphrase und Eselssätze." manuscript. Universität Konstanz. [Papier 105 des Sonderforschungsbereichs 99, Universität Konstanz]
- Beaver, David: 1995. "Accommodating Topics." manuscript. Universities of Edinburgh and Amsterdam.
- Belnap, Nuel: 1969. "Questions, Their Presuppositions, and How They Can Arise." In *The Logical Way of Doing Things*, ed. K. Lambert. New Haven, Connecticut: Yale University Press.
- Bennett, Michael and Barbara Partee: 1978. *Toward the Logic of Tense and Aspect in English*. Bloomington, Indiana: Indiana University Linguistics Club.
- Berman, Steve: 1987. "Situation-Based Semantics for Adverbs of Quantification." *University of Massachusetts Occasional Papers* 12.

- Berman, Steve: 1990. "Towards the Semantics of Open Sentences: *Wh*-Phrases and Indefinites." In *Proceedings of the Seventh Amsterdam Colloquium*, ed. Martin Stokhof and Leen Torenvliet. University of Amsterdam: ITLI. 53-78.
- Blok, P.: 1993. *The Interpretation of Focus*. Ph.D. Dissertation, University of Groningen.
- Carlson, Greg: 1977. *Reference to Kinds in English*. Ph.D. Dissertation, University of Massachusetts at Amherst.
- Carlson, Lauri: 1983. *Dialogue Games: An Approach to Discourse Analysis*. Dordrecht: Reidel.
- Chafe, Wallace: 1976. "Givenness, Contrastiveness, Definiteness, Subjects, and Topics." In *Subject and Topic*, ed. Charles Li. New York: Academic Press. 25-56.
- Chierchia, Gennaro: 1990. "Anaphora and Dynamic Logic." manuscript. Cornell University.
- Chierchia, Gennaro: 1992. "Anaphora and Dynamic Binding." *Linguistics and Philosophy* 15: 111-183.
- Chierchia, Gennaro: 1993. "Extensions of Dynamic Binding: Reconstruction, Topicalization and Crossover." manuscript. University of Milan.
- Collingwood, R.G.: 1940. *An Essay on Metaphysics*. Oxford:
- Condoravdi, Cleo: 1994. *Descriptions in Context*. Ph.D. Dissertation, Yale University.
- Cooper, Robin: 1975. *Montague's Semantic Theory and Transformational Syntax*. Ph.D. Dissertation, University of Massachusetts at Amherst.
- Cooper, Robin: 1979. "The Interpretation of Pronouns." *Syntax and Semantics* 10: 61-92.
- Cooper, Robin: 1993. "Generalized Quantifiers and Resource Situations." In *Situation Theory and Its Applications. Volume 3.*, ed. Peter Aczel, David Israel, Yasuhiro Katagiri, and Stanley Peters. Stanford University Press. [CSLI Lecture Notes No. 37]
- Cresti, Diana: 1995. *Indefinite Topics*. Ph.D. Dissertation, MIT.
- Croft, Bill: 1986. "Universal Quantifiers and Generic Expressions." manuscript. Stanford University.
- Dahl, Östen: 1974. "Topic-Comment Structure Revisited." In *Topic and Comment, Contextual Boundedness and Focus*, ed. Östen Dahl. Hamburg: Helmut Buske. 1-24. [Papers in Text Linguistics 6]
- Dahl, Östen: 1975. "On Generics." In *Formal Semantics of Natural Language*, ed. Edward Keenan. Cambridge: Cambridge University Press. 99-111.
- Dahl, Östen and Christina Hellman: 1995. "What Happens When We Use an Anaphor?" Handout of a talk given at The XVth Scandinavian Conference of Linguistics, Oslo, Norway.
- Diesing, Molly: 1990. *The Syntactic Roots of Semantic Partition*. Ph.D. Dissertation, University of Massachusetts at Amherst.
- Diesing, Molly: 1992. *Indefinites*. Cambridge, MA: MIT Press.
- Dryer, Matthew: 1994. "The Pragmatics of Focus-Association with *Only*." manuscript. SUNY Buffalo. [Paper presented at the 1994 LSA Meeting in Boston]
- Enç, Mürvet: 1991. "The Semantics of Specificity." *Linguistic Inquiry* 22(1): 1-25.
- von Fintel, Kai: 1992a. "Adverbial Quantification, Complex Conditionals, and Focus." *SALT* 2: 59-78.
- von Fintel, Kai: 1992b. "Adverbs of Quantification, Conditionals, and Presupposition Accommodation." *WCCFL* 11: 510-524.
- von Fintel, Kai: 1994. *Restrictions on Quantifier Domains*. Ph.D. Dissertation, Graduate Student Linguistics Association (GLSA), University of Massachusetts, Amherst.
- von Fintel, Kai: 1995. "Minimal Replies to Berman, Dekker, Hajicova, Sgall, and de Swart." manuscript. MIT. [To appear in Hans Kamp & Barbara Partee (eds.), *Proceedings of the Workshop on "Context-Dependence in Analysis of Linguistic Meaning*, IMS Stuttgart]

- von Fintel, Kai: 1996a. "Conditionals, Generics, and the Semantics/Pragmatics Interface." manuscript. MIT. [To be delivered at SALT 6, Rutgers, April 1996]
- von Fintel, Kai: 1996b. "The Interaction of *Only* with Quantifiers." *MIT Working Papers in Linguistics Syntax & Semantics Volume*. [to appear]
- von Fintel, Kai: 1996c. "Specific Generics." manuscript. MIT. [Talk given at Rutgers Colloquium, February 23, 1996]
- Gazdar, Gerald: 1979. *Pragmatics: Implicature, Presupposition and Logical Form*. New York: Academic Press.
- Groenendijk, Jeroen and Martin Stokhof: 1984. *Studies on the Semantics of Questions and the Pragmatics of Answers*. Ph.D. Dissertation, University of Amsterdam.
- Gundel, Janet: 1975. "Left Dislocation and the Role of Topic-Comment Structure in Linguistic Theory." *Ohio State University Working Papers in Linguistics* 18.
- Gundel, Jeanette: 1977. *Role of Topic and Comment in Linguistic Theory*. Bloomington: Indiana University Linguistics Club.
- Gussenhoven, Carlos: 1984. *On the Grammar and Semantics of Sentence Accents*. Dordrecht: Foris.
- Hamblin, C.: 1973. "Questions in Montague English." *Foundations of Language* 10: 41-53. [reprinted in Barbara Partee (ed.), 1976, *Montague Grammar*.]
- Heim, Irene: 1990. "E-Type Pronouns and Donkey Anaphora." *Linguistics and Philosophy* 13: 137-177.
- Heim, Irene: 1991. "Artikel und Definitheit." In *Semantik: Ein internationales Handbuch der zeitgenössischen Forschung*, ed. Arnim von Stechow and Dieter Wunderlich. Berlin: Walter de Gruyter. 487-535.
- Jackendoff, Ray: 1972. *Semantic Interpretation in Generative Grammar*. Cambridge, MA: MIT Press.
- Johnston, Michael: 1994. *The Syntax and Semantics of Adverbial Adjuncts*. Ph.D. Dissertation, University of California at Santa Cruz.
- Kamp, Hans: 1979. "Semantics versus Pragmatics." In *Formal Semantics and Pragmatics for Natural Language*, ed. Franz Guenther and S.J. Schmidt. Dordrecht: Reidel. 255-287.
- Kamp, Hans and Barbara Partee: 1994. "Context-Dependence in the Analysis of Linguistic Meaning." [Topical Background for 1995 Workshop (Prague and Stuttgart)]
- Keenan, Eleanor Ochs and Bambi Schieffelin: 1976. "Topics as a Discourse Notion." In *Subject and Topic*, ed. Charles Li. New York: Academic Press.
- Kiss, Katalin: 1994. "On Generic and Existential Bare Plurals and the Classification of Predicates." manuscript. Linguistic Institute of the Hungarian Academy of Sciences, Budapest.
- Kratzer, Angelika: 1989a. "An Investigation of the Lumps of Thought." *Linguistics and Philosophy* 12: 607-653.
- Kratzer, Angelika: 1989b. "Stage-Level and Individual-Level Predicates." In *Papers on Quantification*, ed. Emmon Bach, Angelika Kratzer, and Barbara Partee. University of Massachusetts at Amherst. [to appear in Greg Carlson et. al. (eds.), *The Generic Book*]
- Kratzer, Angelika: 1990. "How Specific is a Fact?" manuscript. University of Massachusetts, Amherst. [to appear in *Linguistics and Philosophy*, draft also appeared in *Proceedings of Conference on Theories of Partial Information*, January 25-27, 1990, Center for Cognitive Science, University of Texas at Austin]
- Kratzer, Angelika: 1991a. "Pseudoscope: Ambiguities in Opaque Contexts." Handout of a talk given at LSA-ASL Meeting, University of California, Santa Cruz,

- Kratzer, Angelika: 1991b. "The Representation of Focus." In *Semantik: Ein internationales Handbuch der zeitgenössischen Forschung*, ed. Arnim von Stechow and Dieter Wunderlich. Berlin: Walter de Gruyter. 825-834.
- Krifka, Manfred: 1987. "An Outline of Genericity." manuscript. Universität Tübingen.
- Krifka, Manfred: 1990. "Four Thousand Ships Passed Through the Lock: Object-Induced Measure Functions on Events." *Linguistics and Philosophy* 13: 487-520.
- Krifka, Manfred: 1992a. "Focus, Quantification, and Dynamic Interpretation." manuscript. University of Texas at Austin. [Paper presented at 8th Amsterdam Colloquium, Dec. 1991]
- Krifka, Manfred: 1992b. "A Framework for Focus-Sensitive Quantification." *SALT* 2: 215-236.
- van Kuppelvelt, Jan: 1991. *Topic en Comment: Expliciete en Impliciete Vraagstelling in Discourse*. Ph.D. Dissertation, University of Nijmegen.
- Landman, Fred: 1986. *Towards a Theory of Information. The Status of Partial Objects in Semantics*. Dordrecht: Foris. [PhD Dissertation, University of Amsterdam]
- Lewis, David: 1968. "Counterpart Theory and Quantified Modal Logic." *Journal of Philosophy* 65: 113-126.
- Lewis, David: 1971. "Counterparts of Persons and Their Bodies." *Journal of Philosophy* 68: 203-211.
- Lewis, David: 1975. "Adverbs of Quantification." In *Formal Semantics of Natural Language*, ed. Edward Keenan. Cambridge: Cambridge University Press. [Circulated in 1972 under the title "Adverbs that quantify"]
- Lewis, David: 1986. *On the Plurality of Worlds*. Oxford: Blackwell.
- Li, Charles and Sandra Thompson: 1976. "Subject and Topic: A New Typology of Language." In *Subject and Topic*, ed. Charles Li. New York: Academic Press. 457-489.
- McNally, Louise: 1995. "On Recent Formal Analyses of Topic". ms.
- Partee, Barbara: 1984a. "Compositionality." In *Variety of Formal Semantics. Proceedings of the 4th Amsterdam Colloquium, September 1982*, ed. Fred Landman and Frank Veltman. Dordrecht: Foris.
- Partee, Barbara: 1984b. "Nominal and Temporal Anaphora." *Linguistics and Philosophy* 7: 243-286.
- Partee, Barbara: 1991. "Topic, Focus and Quantification." *SALT* 1: 159-187.
- Percus, Orin: 1995. "Topics and Semantic Partition." manuscript. Massachusetts Institute of Technology. [Talk given at WCCFL Workshop on Predication at USC]
- Portner, Paul: 1992. *Situation Theory and the Semantics of Propositional Expressions*. Ph.D. Dissertation, University of Massachusetts at Amherst.
- Prince, Ellen: 1978. "A Comparison of *Wh*-Clefts and *It*-Clefts in Discourse." *Language* 54: 883-906.
- Prince, Ellen: 1981. "Topicalization, Focus-Movement, and Yiddish-Movement: A Pragmatic Differentiation." *BLS* 7: 249-264.
- Prince, Ellen: 1993. "On Syntactic Form in Discourse Processing." Handout of a talk given at CUNY Sentence Processing Conference, UMass Amherst.
- Quine, Willard van Orman: 1966. *Elementary Logic (Revised Edition)*. Cambridge, MA: Harvard University Press.
- Reinhart, Tanya: 1981. "Pragmatics and Linguistics: An Analysis of Sentence Topics." *Philosophica (Gent, Belgium)* 27: 53-93.
- Roberts, Craige: 1994. "If and When: The Semantics of Conditional and Temporal Subordinating Conjunctions." manuscript. The Ohio State University.

- Roberts, Craige: 1995. "Domain Restriction in Dynamic Semantics." In *Quantification in Natural Languages*, ed. Emmon Bach, Eloise Jelinek, Angelika Kratzer, and Barbara Partee. Dordrecht: Kluwer. [to appear in Emmon Bach, Eloise Jelinek, Angelika Kratzer, and Barbara Partee (eds.), *Cross-Linguistic Quantification*, Dordrecht: Kluwer]
- Rooth, Mats: 1985. *Association with Focus*. Ph.D. Dissertation, University of Massachusetts at Amherst.
- Rooth, Mats: 1992. "A Theory of Focus Interpretation." *Natural Language Semantics 1*: 75-116.
- Rooth, Mats: 1994. "A Hybrid Architecture for Focus." Handout of a talk given at a Linguistic Colloquium, Massachusetts Institute of Technology.
- Rooth, Mats: 1995(1991). "Indefinites, Adverbs of Quantification, and Focus Semantics." In *The Generic Book*, ed. Greg Carlson and Jeff Pelletier. Chicago: University of Chicago Press. 265-299.
- Schubert, Lenhart and Jeff Pelletier: 1987. "Problems in the Interpretation of the Logical Form of Generics, Bare Plurals, and Mass Terms." In *New Directions in Semantics*, ed. Ernest LePore. London: Academic Press. 387-453.
- Schubert, Len and Jeff Pelletier: 1989. "Generically Speaking, or, Using Discourse Representation Theory to Interpret Generics." In *Properties, Types and Meaning. Volume II: Semantic Issues*, ed. Gennaro Chierchia, Barbara Partee, and Raymond Turner. Dordrecht: Kluwer. 193-268.
- Schwarzschild, Roger: 1991. *On the Meaning of Definite Plural Noun Phrases*. Ph.D. Dissertation, University of Massachusetts at Amherst.
- Schwarzschild, Roger: 1993. "The Contrastiveness of Associated Foci." manuscript. Hebrew University of Jerusalem.
- Selkirk, Elizabeth: 1993. "Sentence Prosody: Intonation, Stress and Phrasing." In *Handbook of Phonological Theory*, ed. John Goldsmith. Oxford: Basil Blackwell. [to appear]
- von Stechow, Arnim: 1991. "Current Issues in the Theory of Focus." In *Semantik: Ein internationales Handbuch der zeitgenössischen Forschung*, ed. Arnim von Stechow and Dieter Wunderlich. Berlin: Walter de Gruyter. 804-825.
- Strawson, Peter: 1964. "Identifying Reference and Truth Values." *Theoria 30*: 96-118.
- Stump, Greg: 1981. *The Formal Semantics and Pragmatics of Free Adjuncts and Absolutes in English*. Ph.D. Dissertation, Ohio State University. [published in 1985 under the title *The Semantic Variability of Absolute Constructions* by Reidel, Dordrecht]
- de Swart, Henriëtte: 1991. *Adverbs of Quantification: A Generalized Quantifier Approach*. Ph.D. Dissertation, Rijksuniversiteit Groningen.
- de Swart, Henriëtte: 1995. "Syntax, Semantics, and Pragmatics of Restrictions on Quantifiers: Review of von Fintel (1994)." *GLOT International 1*(2): 9-10.
- Szabolcsi, Anna: 1981. "The Semantics of Topic-Focus Articulation." In *Formal Methods in the Study of Language*, ed. Jeroen Groenendijk, Theo Janssen, and Martin Stokhof. Amsterdam: Mathematisch Centrum. 513-540.
- Taglicht, Josef: 1984. *Message and Emphasis: On Focus and Scope in English*. London: Longman.
- Tsai, Wei-Tien: 1994. *On Economizing the Theory of A-Bar Dependencies*. Ph.D. Dissertation, Massachusetts Institute of Technology.
- Vallduví, Enric: 1992. *The Informational Component*. New York: Garland.
- Vallduví, Enric: 1993. "Information Packaging: A Survey." manuscript. University of Edinburgh.
- Ward, Gregory: 1986. *The Semantics and Pragmatics of Preposing*. Ph.D. Dissertation, University of Pennsylvania. [Published in 1988 in Outstanding Dissertations in Linguistics Series by Garland, New York.]

- Ward, Gregory and Julia Hirschberg: 1985. "Implicating Uncertainty: The Pragmatics of Fall-Rise Intonation." *Language* 61(4): 747-776.
- Ward, Gregory and Ellen Prince: 1991. "On the Topicalization of Indefinite NPs." *Journal of Pragmatics* 16: 167-177.
- Ward, Gregory, Richard Sproat, and Gail McKoon: 1991. "A Pragmatic Analysis of So-Called Anaphoric Islands." *Language* 67(3): 439-474.