

Topic, Focus and Quantification

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Abstract. In this working paper I explore the possibility of fruitfully combining some aspects of the contemporary Prague School perspectives on topic and focus (Hajičová and Sgall et al), and other contemporary work such as Rooth's, Krifka's, and Kratzer's on focus-sensitive constructions, with the kind of analysis of quantificational structures found in the work of Heim and Kamp. In particular I am interested in seeing how far one can push the thesis that topic (or probably rather "focus-frame") corresponds to restrictive clause (or domain restriction) and focus to nuclear scope in tripartite structures. In surveying a range of focus-sensitive constructions, we observe that most of them are quantificational in some sense, and require something like a tripartite structure for their interpretation. I pursue the suggestion that the quantificational role of focus and focus-frames is a natural extension of their discourse role: in a discourse context, the set of alternatives provided by the focus-frame locates the ("new") conversational content with respect to common ground or background; with focus-sensitive operators, the focus-frame's set of alternatives contributes to the specification of the domain to be quantified over (or of some analogous argument of other essentially binary operators.) I will discuss some apparent problems and possibly conflicting generalizations. I will not claim to settle the issue of the extent to which the correlation between focus-frame/focus and restrictive clause/nuclear scope is grammaticized in languages like English, and in fact most of the hard questions relating to how and where focus relates to the grammar are left open by the informal observations discussed here.

0. Introduction.

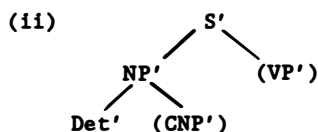
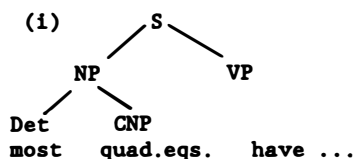
I begin with some brief background comments about quantification, principally in order to be able to presuppose in what follows the notion of tripartite structures and their division into operator, restrictive clause, and nuclear scope. The central section of the paper, section 2, is concerned with an examination of the claim that there is a linguistically significant correlation between restrictive clause and focus-frame on the one hand and nuclear scope and focus on the other. That section includes some informal discussion of the notions of topic and focus, mentions the Prague school claim that such notions are basic in the determination of such matters as quantifier scope, proceeds to an annotated inventory of focus-sensitive constructions which seems to substantiate the central correlation, and concludes with some speculations about the possible explanatory basis of the correlation. The brief section 3 notes some limits to the correlation and suggests that the correlation has the status of a kind of "default", one that can be overruled by the syntax. Section 4 takes up some apparent problems and possibly conflicting generalizations which I believe can be largely explained away, either by clarifying the notion of contrastive topic or by suitably articulating the recursive properties of focus constructions and the possibility of contextual "inheritance" of focus structure across sentences in a discourse. The paper ends with some brief concluding remarks and pointers towards some of the many open problems left untouched or unresolved.

1. Quantificational Structures

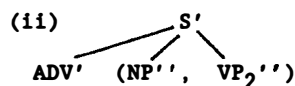
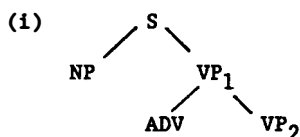
1.1 A-Quantifiers vs. D-quantifiers.

Partee, Bach and Kratzer 1987 introduce the terminology "D-quantifier" for determiner quantifiers and "A-quantifier" for adverbial quantifiers (and some other "verb-oriented" quantificational devices not of direct concern here). D-quantification, well-studied since Lewis (1970) and Montague 1973 and subsequent work on generalized quantifiers, is illustrated in (1); A-quantification, brought to prominence by Lewis 1975 and richly exploited in subsequent work by Kamp 1981 and Heim 1982, are illustrated in two different constructions in (2) and (3). In each case, a rough syntactic structure is given in (i) and a rough semantic function-argument structure in (ii). Sentences (1) and (2) have virtually identical truth conditions although syntactically structured in rather different ways; sentence (3) is a classic donkey-sentence whose analysis in a Kamp-Heim framework exploits the "unselective binding" properties of adverbs of quantification, first noted by Lewis.

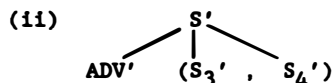
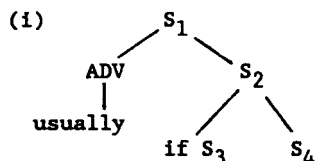
- (1) Most quadratic equations have two different solutions.



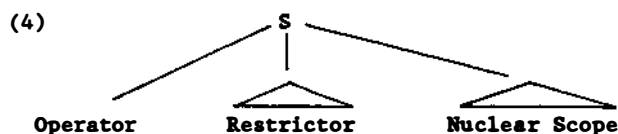
- (2) (a) A quadratic equation usually has two different solutions.
 (b) Usually, x is a quadratic equation, x has two different solutions



- (3) (a) Usually, if a man owns a donkey, he beats it.
 (b) Usually, x_1 is a man and x_2 is a donkey and x_1 owns x_2 , x_1 beats x_2



1.2 Tripartite Structures as a unifying generalization. The terminology of tripartite structures shown in (4), used by Heim to represent what the D-quantification and A-quantification structures have in common, is useful at least at a metalevel in discussing the properties of various kinds of quantificational structures. The concept of restricted quantification which lies behind such structures is of course much older (back to Aristotle, at least) and has a long history in logic, philosophy, and linguistics.



It is possible that these tripartite structures do not actually represent the linguistic structure of any of the examples; it could be the case, for instance, that there is always some binary-branching nested structure in each instance. So I use the tripartite structure for the purposes of discussing certain generalizations without intending any further commitment to its application within the grammar of any particular construction in English or any other language.

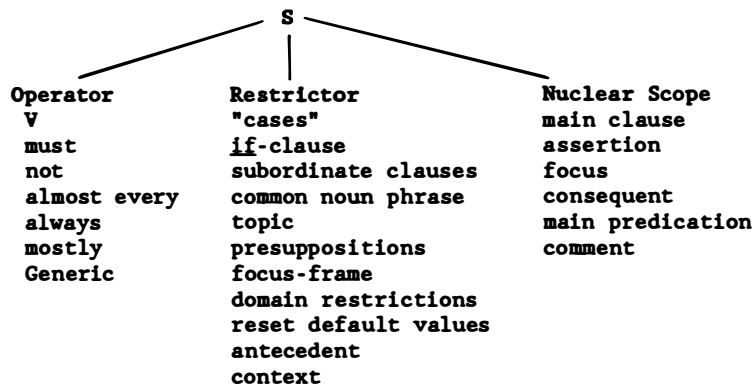
Among the issues concerning tripartite structures that we will be concerned with in what follows are the following: What aspects of linguistic structure determine/constrain logical structure? And among the relevant aspects of structure to consider, there are at least constituent structure, function-argument structure, and focus structure. It is the role of the latter that will be our central concern.

2. The correlation: Restrictive Clause : Focus-frame :: Nuclear Scope : Focus

2.0. Some background for the correlation.

2.0.1. The parts of tripartite structures: what goes into restrictors? The following generalized picture of tripartite structures mentions a number of hypothesized syntactic, semantic, and pragmatic structures that can be argued to be correlated with each other and with the basic tripartite scheme; some will be discussed below, others are discussed in Partee, Bach and Kratzer (1987) or in Partee (1991), and others will be discussed in work that is still in preparation. The main claim here, which will be illustrated in subsequent sections, is that the syntax (if we don't count focus structure as part of the syntax) sometimes leaves unspecified or underspecified what goes into the restrictor clause of a tripartite structure, and focus structure frequently plays an important role in determining how the parts of the meaning of a sentence are divided up in tripartite structures, information that can be essential to assigning truth-conditions to a sentence.

(5)



2.0.2. Topic-comment; Topic-focus; focus-presupposition; focus - focus-frame; focus-background; theme-rheme. Now comes the part that makes me most nervous: trying to say what I think I mean by notions such as topic and comment. There is a very large literature on the subject, only some of which I am acquainted with, but it is evident to anyone who reads even only a few works on the subject(s) that different authors use terminology quite differently, in part because there is not agreement about how to carve up the phenomena under study in the most appropriate way, and in part because even authors who are not necessarily in disagreement are following varied precedents in choice of terminology.

To begin very informally, I take the core of the notion of "topic" to be roughly characterized by such expressions as "old", "given", "known", "what the sentence is about", "anchor (for the hearer)". Equally roughly, the "comment" is then the "new" part, or what is being said about the topic.

I must immediately invoke lots of caveats -- this is a simplistic characterization for some discourse contexts, which doesn't cover recursive structures, and which glosses over many distinctions and necessary refinements; just to pick one interesting observation about the limited utility of the "old"- "new" dimension, take the observation of Selkirk 1984 on the differences between focused arguments and focused verbs: only focused ARGUMENTS must be new (if anything must), not focused verbs.

Looking at what has been said under the label of "focus vs. something" rather than "topic-comment", I offer the following from Rooth 1989 as a clear expression of a central and fruitful idea behind the notion of focus: "The focus structure of a sentence expresses contrast with or alternatives to the proposition denoted by the sentence".

Rooth 1985 argues that the principal contribution of focus structure is a set of alternatives; the corresponding existential presupposition (invoked by Chomsky 1971 and Jackendoff 1972 and many subsequent authors) can be derived as the union (disjunction) of all the alternatives in the given set. Kratzer 1991 notes that a question meaning on some theories (e.g. Hamblin 1973) is likewise a set of alternatives: the set of propositions that count as possible direct answers. The traditional presupposition of a WH-question comes out as similarly as the union of this set of alternatives, the same set of alternatives as would arise for a declarative sentence with a focused element in place of the WH-phrase.

What to call the antithesis of focus is not clear; even authors who show close agreement on ideas differ in terminology. If the set of alternatives is more fundamental than the presupposition that can be generated by taking their union, the terminology "focus-presupposition" is not ideal; I will alternate among "focus-background", "focus - focus-frame", and sometimes just "focus structure"; I am not sure where these terms originated.

Now how do we want to relate the topic-comment distinction to the focus-background distinction: topic = background? focus = comment? Perhaps the two distinctions are quite similar, but when the topic or background part is local and the focus or comment broad, the notions "topic-comment" are more salient, and conversely when the topic or background is broad and the focus or comment is local, the notion "focus" is more salient. But it seems that one can have both marked on local constituents (e.g. in Hungarian, or in English in a topicalized structure with focus somewhere inside the non-topicalized part), with the rest of the sentence relatively neutral, suggesting that there are (at least) two separate distinctions to be made.

Perhaps some of what they have in common can be seen by relating "topic" to Rooth's remarks about focus structure: topic and focus-frame establish a set of alternatives having some things in common. In their discourse functions, that much should be known or uncontroversially acceptable by the discourse participants. In the case of a typical NP topic, knownness may amount to acquaintance with an individual and the alternatives may be of the vague "what about John?" sort; in the case of a typical focus-frame, the alternatives are propositions that differ in the values filled in for what we usually think of as a variable standing in place of the focused element.

Krifka (this volume), citing Dahl and Jacobs in part, suggests that one can capture both topic-comment and focus-background with structured meanings. On his view some of the differences are as follows: a topic must be a constituent (comment need not be); focus must be a constituent or a "list"

of constituents (background need not be). Felicity conditions also differ: in the case of topic-comment, they include the requirement that the topic is established as such in the discourse, while both comment and focus include a requirement of existence of relevant alternatives. Topic-comment structures "take precedence" over focus-background structures; both topic and comment may contain focus-background structures, as discussed in Carlson (1983); example (6) below is from Krifka (this volume).

- (6) -What did Bill's sisters do?
 -[Bill's [youngest]_F sister]_T [kissed John]_C.

The focus within the topic is providing a "contrastive topic"; the whole of the comment part in the top-level topic-comment structure is presumably also by default the focused part of the entire sentence.

Another recent study which suggests a different way of organizing the topic-comment and focus-background distinctions is Vallduví 1990; Vallduví reverses the precedence suggested by Krifka, giving arguments that are centered in pragmatics and expressing some scepticism about the recursive focus structures advocated by Krifka and defended below in section 4.

2.1 Prague school: Topic-Focus Articulation (TFA) and Scale of Communicative Dynamism (CD).

Linguists in the Prague school have been taking focus structure and its place in the grammar very seriously for many years. A recent statement relevant to the central concerns of this paper is the following:

Instead of such means as parentheses, variables, and prenex quantifiers, natural languages exhibit, at TL [the "tectogrammatical level", comparable to deep structure. -BHP], the topic-focus articulation, the scale of CD ('deep word order'), and other features from which the scopes of operators can be derived."
 -Hajičová and Sgall (1987) "The Ordering Principle".

I must confess to having been deeply skeptical about this claim when Professors Hajičová and Sgall and I began discussing it in the fall of 1989; but over the course of our discussions my attitude changed first to grudging agnosticism and then to a position (where I am now) of believing that some form of such a principle is likely to be true, and the challenge I have put to myself is to see if I can find a way of understanding and articulating the Prague school work (perhaps with some modifications) and of understanding and articulating the various

kinds of quantificational and other relevant semantic structures so that one can test the scope and the explanatory bite of some version of the principle. I take the correlation enunciated in section 2.0 as an instantiation of one aspect of this principle.

2.2 Which constructions are focus-sensitive?

As a first step toward testing the claimed correlation, I offer a tentative inventory of focus-sensitive constructions, constructions which contain some operator which, in Rooth's terminology, "associates with focus", and is such that different choices of focus can result in sentences with different truth conditions. This semantic effect is different from, but sometimes confusable with, two other possible effects of focus, a normal contrastive discourse function, and a disambiguating effect. I am not sure I have succeeded in listing all and only real "association with focus" cases, but in order to try to make it clear what I'm trying to do, I will occasionally mention minimal pairs or triples contrasting a case of the kind of focus-sensitivity I do want to count with cases of the other two sorts of focus effects. Roberts 1990 discusses a number of the same classes of cases, and I have benefitted from her observations.

2.2.1 Adverbs of quantification and of frequency. The first kinds of cases I will discuss come from Rooth 1985, one of the principal starting points (along with work by such authors as Jacobs and von Stechow) for contemporary work on the formal semantics of association with focus. Drawing on Stump's 1985 analysis of the argument structure of frequency adverbs, Rooth noted that focus can make a crucial difference in establishing what material from the sentence ends up in the restrictive clause and what in the nuclear scope, hence critically affecting the resulting truth conditions. Thus examples (7a-c) below all have different truth conditions.

- (7) (a) Mary always took JOHN to the movies.
 (b) Mary always took John to the MOVIES.
 (c) MARY always took John to the movies.

Note that if we replace the quantificational adverb always by a specific adverb such as yesterday, the resulting sentences may differ in their felicity conditions and their presuppositions or implicatures, but they do not differ in truth conditions; thus (7) vs. (8) is an instance of truth-conditional vs. merely discourse-related effects of focus.

- (8) (a) Mary took JOHN to the movies yesterday.
 (b) Mary took John to the MOVIES yesterday.
 (c) MARY took John to the movies yesterday.

2.2.2 Only, even, also. The focus-sensitivity of the particles only, even, and also, also analyzed by Jacob 1983 and Rooth 1985, is even more well-known. The sentences (9a) and (9b) have very clear differences in truth-conditions. In the case of even and also the differences are in presupposition rather than truth-conditions but are otherwise very similar. Again note that if one were to remove the operator only from (9a) and (9b), focus would then have an effect only at the discourse level, but no effect on truth conditions.

- (9) (a) John only introduced Bill to SUE. [even, also]
 (b) John only introduced BILL to Sue.

2.2.3 Counterfactuals. Philosophers of language have argued in a number of contexts about whether focus plays a role in truth conditions or only with respect to language use and the pragmatics of discourse; the nature of the contribution of focus to sentences about causation has been particularly problematic and controversial. Dretske 1972 pointed out a number of philosophically interesting cases where focus seems undeniably to play a role in determining truth conditions, particularly notably in the case of counterfactual conditionals. Examples (10a-b) are Dretske's.

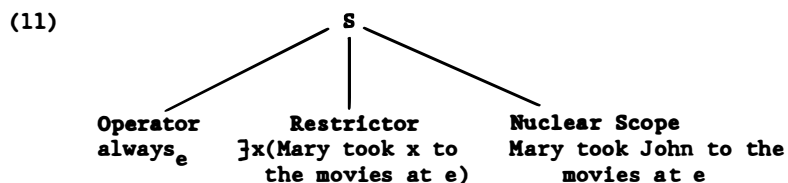
- (10) (a) If Clyde hadn't married BERTHA, he would not have been eligible for the inheritance.
 (b) If Clyde hadn't MARRIED Bertha, he would not have been eligible for the inheritance.

An example of a case in which (10b) would be true and (10a) would be false is a situation in which Clyde did marry Bertha, Clyde and Bertha had been living together but hadn't decided whether they wanted to get married or not, and Clyde's father's will specified only that Clyde must be married to receive the inheritance, with no restrictions on who Clyde must marry. One can construct a case where (10a) would be true and (10b) false by considering a will that specified that Clyde should either remain a bachelor or, if he married, it must be to someone with some particular characteristics, characteristics that Bertha had but another woman in Clyde's life whom he might have married did not have.¹

2.2.4 Some discussion of the cases so far. Before proceeding to other kinds of examples, I should say a word about the semantic analysis of some of the constructions we have looked at so far. There are by now several alternative proposals for formalizing the semantics of focus and of focus-sensitive operators. There are interesting differences among these analyses and it is far from clear what the best analysis is. Here I am contenting myself with a very rough analysis that represents only some of the most central features of what I believe the currently competing analyses more or less have in common.

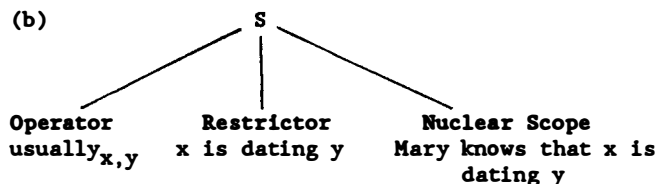
The tripartite structure in (11) below gives an approximate analysis of the semantics of sentence (7a), repeated below with focus explicitly marked.

(7a) Mary always took [John]_F to the movies



It is interesting to compare this with the work of Berman (1989, 1991) on the interaction of adverbs of quantification with embedded questions, free relatives, concealed questions, and definites (the quantificational variability of definites is also discussed in Kratzer 1989b). Berman notes that a sentence such as (12a) below has an interpretation that can be represented by the tripartite structure in (12b), and he offers an explanation for this phenomenon making crucial use of the accommodation of presuppositions.

(12) (a) Mary usually knows who is dating whom



Berman notes that since know is factive, a sentence of the form "Mary knows that S" presupposes the truth of S; and given the independent motivation for accommodating presuppositions of the nuclear scope of quantificational structures into the restrictor

clause (some of which motivation I will mention just below), together with his analysis of WH-words as variables, the restrictor in (12b) is derived as shown.

An example illustrating the independent need to assume that presuppositions of the nuclear scope are readily accommodated into the restrictive clause is Schubert and Pelletier's classic example from their 1988 paper, (13). The basic principle is articulated in Heim (1983).

(13) Cats always land on their feet.

The question that I want to raise about the relation of Berman's analysis to the analysis of focus-sensitive operators is whether the two phenomena are somehow fundamentally the same and whether the analyses are in effect already virtually the same. Certainly in the literature there has always been a strong parallel between "focus and presupposition" and "question and presupposition", and appropriateness as an answer to various WH-questions has routinely been taken as a central diagnostic of focus. If we assume that WH-words are necessarily foci of the questions they head, it would seem that it must be possible to see these two phenomena as basically the same; perhaps this is already explicit in some part of the literature that I have overlooked.

2.2.5 Modals. Halliday 1970 tells of a sign in the London underground saying "Dogs must be carried" and describes a hypothetical hapless character who sees the sign and is worried because he has no dog. The character is presumably reading the sign with focus on dogs and interpreting it as represented roughly in (14b) rather than as the presumably intended (14a).

(14) (a) Dogs must be CARRIED

MUST (dog(x) & here(x) , x is carried)

(b) DOGS must be carried

(?) MUST (here(e) , a dog or dogs is/are
carried at e)

or: MUST (you carry x here, you carry a dog
here)

Note that if the sign had said "Shoes must be worn", the (b)-type analysis would indeed have been the appropriate one.

Examples of this kind, and the probable relatedness of the focus sensitivity of modals, D-quantifiers, and A-quantifiers, are discussed in Partee, Bach and Kratzer (1987). Kratzer 1989b

and Diesing 1989 have developed analyses that capture the fact that only stage-level predicates or other cases of what they analyze as VP-internal subjects allow the subject to map into the nuclear scope as in the (b) case above. Thus while one has a choice of subject or predicate focus in (out-of-the-blue utterances of) (15), with the stage-level predicate "available", one cannot (except in a context allowing a contrastive interpretation) focus the subject of (16), with the individual-level predicate "expensive".

- (15) (a) TICKETS are available.
 (b) Tickets are AVAILABLE.
 (16) (a) *TICKETS are expensive.
 (b) Tickets are EXPENSIVE.

2.2.6 Frequency adverbs. Sgall et al (1986) discuss quite a range of examples where choice of focus affects truth conditions, including examples like (17) below. These are similar to the cases of quantificational adverbs discussed above.

- (17) (a) LONDONERS most often go to Brighton.
 (b) Londoners most often go to BRIGHTON.

2.2.7 Generics. The effect of focusing on the interpretation of generic sentences is well known and much discussed; since generics have posed challenging problems for semantic analysis in general, it is not surprising that the analysis of the interaction of focus and genericity is still a matter of debate. One way of understanding many relatively straightforward cases such as (18) and (19) below, from Sgall et al (1986), is as basically similar to the cases with adverbs of quantification, with an understood generic operator of some sort in place of the quantificational operator. The focus-frame goes into the restrictive clause, thus delimiting what sorts of contrasting cases are being quantified over by the implicit generic operator- e.g. in (18) over possible activities that one might carry out when one is in the hallway or over possible places where one might do one's smoking.

- (18) (a) One SMOKES in the hallway.
 (b) One smokes in the HALLWAY.
 (19) (a) English is spoken in the SHETLANDS.
 (b) ENGLISH is spoken in the Shetlands.

2.2.8 WHY-questions. It has been pointed out by Hajičová and others (see Dretske 1972, 1975, Hajičová 1984, Bromberger 1987,

Engdahl 1985) that WHY-questions are focus-sensitive in a way that other WH-questions are not. While one cannot speak of truth-conditions of questions directly, one can speak of truth-conditional effects of focus in terms of what counts a true answer. The two WHY-questions in (20) below can in principle have different true answers; e.g. one can imagine a scenario where Clyde had to make both a choice between two women and in either case there was a question of getting married or just living together, and where "in order to be eligible for Social Security benefits" might be a true answer to the second but not the first while "because Bertha could stand his snoring and Agatha couldn't" might be a true answer to the first but not to the second.

(20) Why did Clyde marry BERTHA?/ Why did Clyde MARRY Bertha?

By contrast, a WHEN-question may show "discourse effects" of focus, but different choices of focus do not directly affect what counts as a true answer (although they could indirectly do so by disambiguating an ambiguous structure, for instance).

(21) When did your BROTHER visit Paris?/ When did your brother visit PARIS?

These two questions may have different felicity conditions in a discourse and suggest different states of background knowledge or interest on the part of the speaker, but a true answer to one is necessarily a true answer to the other.

As far as I know, WHY-questions are the only class of questions for which focus actually affects truth conditions.² The question of why this should be so is raised below (but not answered.)

2.2.9 Emotive factives and attitude verbs. It may be controversial that the actual truth-conditions of sentences containing emotive factive verbs and verbs of propositional attitude are affected by changes in focus, but that appears to be the case, as evidenced by examples like the following:

- (22) (a) It's odd that Clyde married BERTHA/... MARRIED Bertha/ etc.
 (b) I found out that OTTO shot Lefty/ that Otto shot LEFTY/ etc. (Dretske 1975)

An analysis of such cases has recently been developed by Kratzer (class notes Spring 1991, UMass, Summer 1991, Santa Cruz, and 1991a).

2.2.10 Presupposition vs. allegation under negation. The following case, from Hajičová 1984b, is not exactly a truth-conditional shift. But it does show a related effect, an alternation between presupposition and what Hajičová calls "allegation". Consider the NP "our defeat" in (23a-b): in (23a) it is part of the (Praguan) topic, in (23b) part of the focus.

- (23) (a) This time our defeat wasn't caused by HARRY.
 (b) This time Harry didn't cause our DEFEAT.

On Hajičová's analysis, the proposition that we were defeated (or, equivalently, that the NP "our defeat" has a referent) is a presupposition of the whole sentence only when the NP "our defeat" is part of the topic; but when the NP is part of the focus, that proposition is merely an allegation, something that would be entailed in the corresponding positive sentence but neither it nor its negation entailed under negation.

2.2.11 Superlatives, "first", etc.. Superlatives and related expressions such as ordinals, "principal", etc., have a "domain" argument which is frequently left implicit, in which case the placement of focus can be decisive in determining it and consequently in determining the truth conditions of the sentence. Example (24) below can have a variety of truth conditions depending on where focus is placed.

- (24) The largest demonstrations took place in Prague in November (in) 1989.

If one focuses "Prague", then the claim concerns a comparison of the sizes of the demonstrations in all the places where there were demonstrations in November 1989; if "November", then we are comparing the sizes of demonstrations in Prague in all the months in 1989; if "1989" then we are comparing the sizes of the demonstrations in Prague in November in all the different years.

One can construct interesting minimal pairs involving on the one hand the determiner "most" and on the other hand the superlative structure "the most" (superlative of "much" or "many"): see (25a-c) below.

- (25) (a) Most students got between 80 and 90 on the first quiz.
 (b) The most students got BETWEEN 80 AND 90 on the first quiz.
 (c) The most students got between 80 and 90 on the FIRST quiz.

In the case of the determiner "most", in (25a), the truth conditions are unaffected by topic-focus structure; more than half of the students must have gotten between 80 and 90 on the first quiz, period. But in the case of the superlative structure in (25b-c), focus does affect truth conditions. For (25b) to be true, the relevant partition of ranges of scores on the first quiz must be such that more students scored in the 80-90 range than in any other range (a plurality of the students, not necessarily a majority). For (25c), on the other hand, the comparison involves different quizzes: more students must have gotten between 80 and 90 on the first quiz than on any other quiz.

The claim that truth conditions are unaffected by focus structure in the case of the determiner "most" is slightly too strong, by the way: many authors have noted that focus structures involving adjuncts as in (26) can contribute to the determination of what goes into the restrictive clause.

(26) Most ships pass through the lock [at night]_F.

It is still the case for all possible readings of (26) that the common noun phrase with which the determiner is in construction must go into the restrictive clause and the whole verb phrase goes into the nuclear scope; however, in addition to one reading in which that is all there is to the assignment of tripartite structure, represented in (27a), there is another reading in which the "focus frame" part of the verb phrase interpretation is accommodated into the restrictive clause as well, as represented in (27b).

- (27) (a) MOST, x is a ship, x passes through the lock at night
 (b) MOST, x is a ship and x passes through the lock sometime, x passes through the lock at night

This phenomenon is a normal instance of the accommodation of presuppositions into the restrictive clause seen above in the discussion in section 2.2.4 of Berman's treatment of the quantificational force of embedded questions and also discussed in Heim 1982 and Kratzer 1989b.

2.3 Explanatory basis of the correlation?

The examples we have seen include: modal verbs (must, should, would, and other "universals"), counterfactuals, frequency adverbs/adverbs of quantification (most often, always), the implicit generic operator, WHY questions, negation, only, even, also, superlatives, attitude verbs and emotive factives.

If we count quantification over possible worlds (for the modals, attitude verbs and emotive factives), over degrees of various kinds (for the superlatives), and over various implicit sets that contrast with the given focus (for only, even, also), then all except perhaps the WHY-questions can be considered as operators with some quantificational force.

Why do WHY-questions and not other WH-questions work the same way? Is it because WHY doesn't bind a trace of its own (cf. Bromberger 1987) and the others do? Is it because the question isn't even interpretable without a specification of relevant alternatives? Is it because of the implicit counterfactuality involved in asking and answering WHY questions? I don't know the answer, although I am inclined to favor a possible combination of the second and third alternatives: a WHY-question, unlike other WH-questions, isn't even a well-defined question without a specification of "why this instead of what?", and that may in turn be related to the fact that in order to answer such a question one must counterfactually entertain some family of alternative possible states of affairs and explain why the actual state of affairs is the case rather than any relevant alternative possible state of affairs.

I should also put in a caveat on attitude verbs: it may not be quantification that explains which of them show strongest focus effects - e.g. "just found out", "realize" show stronger effects than "know" and "believe". Also see Kratzer's work in progress (seminar handouts spring 1991) on attitude verbs, and the work of Cresswell and von Stechow (1982) on structured meanings and their role in explicating the relation of focus to semantics of propositional attitude verbs. The structured meaning approach to focus is also pursued in the recent work of Krifka (this volume).

But if we leave aside these possible worries, the main generalization that seems to emerge is the following:

In all the above cases, the tripartite structure is essential to the interpretation, even truth-conditionally, and in all those cases the focus structure appears to be contributing to the tripartite structure as specified in the basic correlation: focus-frame to the restrictive clause and focus to the nuclear scope.

The relation of these semantic effects of focus structure to the pragmatic role of focus structure in discourse seems to have been becoming clearer in recent years. In discourse, the set of alternatives associated with the focus-frame locates the conversational contribution with respect to common ground or background; and it is the union of all those alternatives that

identifies the existential presupposition that is normally identified in cases construed as "focus-presupposition". (See Krifka (this volume) and the work of Jacobs cited therein on the interpretation of "ASSERT" operator, going back to early work of Dahl, among others.)

In the case of the focus-sensitive operators, the focus-frame's set of alternatives contributes to restricting the domain to be quantified over or the analogous first argument of other essentially binary operators. (See Rooth 1985, ms. 1989, ms. 1991, Kratzer ms. 1989, ms. 1991, Krifka this volume)

These generalizations leave many open questions about focusing as a device, e.g. about degrees of grammaticization of different syntactic and prosodic means of identifying focus structures, both within and across languages. Rooth (1991) suggests that neither syntax nor semantics makes explicit reference to intonationally marked focused constituents in English, as opposed to e.g. the cleft construction, which is a grammaticized structure that is obligatorily interpreted as marking focus. What are the differences in properties of focus marked intonationally as in English, by word order as in the Slavic languages, by a distinct focus constituent position as in Hungarian, etc.? Is the ability of focus to "escape islands" limited to intonationally marked or contextually inferred focus? And how does that property relate to what focus is used for?

3. Limits to the correlation; the correlation as default.

From the cases that we looked at in section 2 and the discussion in section 2.3., we have at least gathered some support for the plausibility of the basic correlation "focus-frame : restrictive clause :: focus : nuclear scope". But at the same time it is clear that the correlation is not absolute, and in this section we briefly mention some of the limits and qualifications that must be taken into account as we try to establish the place of the correlation in an overall theory of grammar.

3.1. Syntax wins.

We have already seen some cases where tripartite structures are determined by the syntax and focus may in some cases contribute to the addition of material to a restrictive clause but it cannot override what the syntax explicitly requires. Determiner quantifiers were a case in point, as noted in the discussion of most in section 2.2.11 above. Additional cases of this sort include some cases of constituent negation and some cases of constituent-attached only, even, also.

3.2. "Weak" operators.

In analogy with the "weak quantifiers" (Milsark 1977, Barwise and Cooper 1981), we can identify "weak" modals and other operators. Roughly, these are operators which in some sense have existential-like rather than universal or quasi-universal force -- quantifiers like some, several, three, adverbs of frequency or quantification like sometimes, occasionally, modals like may and can. As discussed in Partee (1988), these have no essential tripartite structure; while they can be represented as binary operators, these operators are (at least in basic truth-conditional respects) symmetrical in their two arguments, which may be thought of as conjoined. Hence with such operators, it is not crucial to determine which material belongs in the restrictor and which in the nuclear scope, at least not for determining the basic truth conditions.

There are also many sentence adverbials discussed by Koptova (1986, 1987) which are not quantificational at all, for which no tripartite structures are needed in the semantics; focus effects in connection with such adverbs appear to be limited to the normal discourse functions of focus.

One interesting operator which I am not certain where to classify is the connective because. On the one hand, it seems in some respects like a factive variant of if (see Frege 1892) but its behavior with respect to the establishment of tripartite structures differs markedly from that of if; material in a because-clause does not automatically get added to the restrictor of some salient operator the way material in an if-clause invariably does (see Carlson 1979 and Farkas and Sugioka 1983), as witnessed by the difference between (28a) and (28b).

- (28) (a) Wolves are always mean if they have blue eyes.
 (b) Wolves are always mean because they have blue eyes.

This difference would be explainable if because is itself an operator while if is not, a plausible assumption on the Lewis-Kratzer-Heim view of the function of if-clauses.

But there are several further aspects of the behavior of because that need to be examined in connection with topic and focus and the principles for building or disambiguating quantificational structures. One is the interaction of because-clauses with negation, a matter that has been subject to great controversy since the early days of generative semantics and which has been given an elegant formalization in terms of Hajičová and Sgall's treatment of topic-comment structure (integrated with a mapping into intensional logic) by Vlk (1988a,b).

In both of the respects mentioned above, because does not act like a focus-sensitive operator. But there is also an obvious affinity among counterfactuals, why-questions, sentences with the

verb cause, and constructions with because; the question of whether any or all of these are showing genuinely truth-conditional effects in association with focus or some more indirect effects having to do with differentially calling up alternative backgrounds against which they are intended to be evaluated is a knotty question which I have not really explored.

3.3 Theoretical challenges.

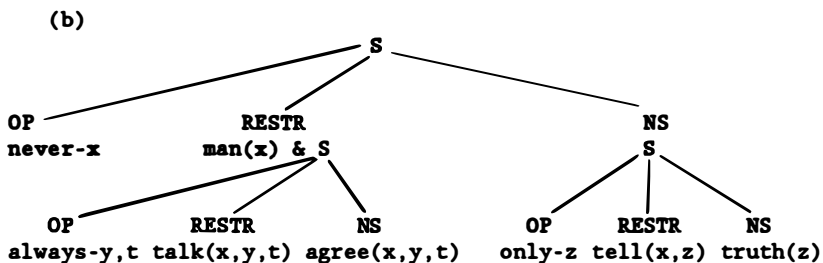
In work which is too recent for me to try to evaluate, Rooth (ms. 1991) proposes constraints against stipulative rules of association with focus: "Neither the syntax of lexical entries nor syntactic rules refer to the focus feature $[]_{Ff}$ Lexical and constructional meanings do not manipulate $[]_{Ff}$." Rooth's position has been challenged by Krifka (this volume) with arguments concerning multiple focus, but Krifka also believes that the principles of association with focus are highly constrained and that the syntax will not require explicit coindexing of focus-sensitive operators with focused constituents. On Rooth's position, the contribution of focus structure to the determination of tripartite structures in the semantics would all have to be indirect, on a par perhaps with the role of local and global accommodation of salient presuppositions discussed by Heim 1983.

4. Apparent problems and possibly conflicting generalizations.

4.1. Recursion

According to Prague school analyses, a sentence has a single division into topic and focus (plus a linear scale of communicative dynamism (CD) within each); but tripartite structures are recursive, and further tripartite structures can occur within either the restrictor or the nuclear scope. An example with both is (29a), whose structure is shown in (29b).

(29) (a) A man who always agrees with whoever he is talking to never tells only the truth.



Wherever one puts the topic-focus boundary, it is clear that for at most one of the operators can the basic correlation hold.

I believe that the basic correlation holds recursively. With respect to a non-recursive Praguian topic-focus structure, I believe the correlation holds directly for the highest operator and indirectly for the embedded ones; the Praguian "scale of communicative dynamism" might therefore better be looked upon as resulting from a recursively nested binary structure rather than being intrinsically linear; compare metrical trees and their determination of linear degrees of stress, etc. See also Selkirk (1984) on recursive focus structures in a different sense, and Krifka (this volume) for explicit treatment of recursive structures using a recursive "structured meanings" approach.

4.2. Counterexamples explainable by "contrastive" emphasis.

Another class of apparent counterexamples is the following. Contrary to the claimed correlation of focus with nuclear scope, it is evident that one can sometimes focus (all or part of) the restrictor. There are two subcases with different explanations.

4.2.1. Tripartite structure determined by syntax. Consider the little dialogue in (30):

- (30) A: Most logicians like linguistics.
B: Most NICE logicians like linguistics.

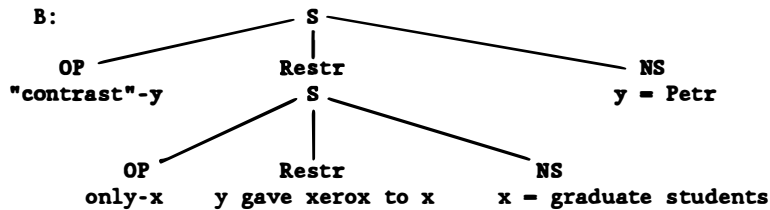
Here the word nice is focused in B's utterance, but it still must remain part of the restrictive clause. This example further reinforces the observation already made above that at least in English, focus structure or topic-focus articulation marked by intonation does not override syntax. In examples like this where syntax dictates the tripartite structure, focus associates with discourse functions such as "ASSERT". This example is similar to example (6) in section 2, an example of focus within topic: its function is to present one topic among alternative possible topics, in some sense a "contrastive topic".

4.2.2 Tripartite structure normally determined (at least partly) by focus structure. But there are also apparent violations of the claimed correlation even in constructions in which the topic-focus articulation does normally determine tripartite structures, e.g. in examples containing focus-sensitive operators such as only. (Examples similar to (31) below can be found in Gussenhoven 1984, Roberts 1990, Rooth ms. 1991, Krifka this volume.)

- (31) A: Eva only gave xerox copies to the GRADUATE STUDENTS.
 B. (No,) PETR only gave xerox copies to the graduate students.

This is an apparent counterexample to the association of only with focus. Without focus marking, (31A) and (31B) would both be potentially ambiguous as to whether the nuclear scope of only is xerox copies or graduate students; structural constraints eliminate the possibility of the nuclear scope being the subject. Sentence A is disambiguated by intonation, and focus corresponds to nuclear scope, as expected; sentence B is disambiguated by the context of the preceding sentence. I would claim that graduate students is still focused in B although the focus is not marked intonationally; the inheritance of focus structure from prior context might be modelled as a higher-order type-shifting operation, where an entire structure like that in (31A) is abstracted on in the subject position to set up a new contrastive topic. (The representation in (32) is very primitive; I have represented things in a way that I hope is intuitively clear, in hopes that the non-specialist can readily grasp the main features of the intended interpretation and the specialist will know what has to be done to turn this into a representation in any one of the currently competing formal theories, since nothing here hangs on the differences among such theories, as far as I can see.)

- (32) A: ONLY-x (Eva gave xerox copies to x, x=graduate students)



On this account, the intonationally marked focus in (31B) has a discourse function of marking a correction, and may perhaps be another case that should be analyzed as contrastive topic. Only still associates with focus, but the focus it associates with in (31B) is one that may not be intonationally marked at all but is "inherited" from the structure of the previous utterance and imputed to the current one. If this sort of type-shifting or focus-inheritance is allowed, we must worry about how to keep generative power and predicted processing loads from growing explosively. As preliminary vague suggestions towards constraints, I would speculate that such shifting must

be either (a) "easy", (b) positively marked as a "shifted" structure, either in a grammaticized way or not; or (c) triggered by failure (of some kind) of unmarked case and itself be the "next least marked" structure or nearly so. Suggestions by Rooth (ms. 1991) would take such problems largely out of the grammar of only, etc., and assimilate them to the problem of finding appropriate antecedents for anaphoric elements.

4.3 Conclusions and open problems.

The basic correlation of focus-frame with restrictive clause and focus with nuclear scope appears to have some reality at least as a default option when not overridden by the syntax. The explanatory basis for the correlation may be found in Rooth's basic idea that the principal semantic contribution of the focus-frame is a set of alternatives; this set of alternatives is typically used to restrict the domain of a focus-sensitive operator.

Looking at a range of focus-sensitive operators, we find that they tend to be higher-order operators which are essentially binary (i.e. require tripartite structures and are not symmetrical in their two arguments), and which are either explicitly quantificational or at least require a set of alternatives as their first argument (restrictive clause). They tend to be cross-categorial operators (like even and only), or operators that syntactically combine with a full sentence or VP but are semantically looking for an open proposition or property to quantify over.

These generalizations leave open many of the hardest questions about how and where focus relates to the grammar, with alternatives ranging from Hajičová and Sgall's proposals where Topic-Focus Articulation is an integral part of the deep structure to Rooth (ms. 1991) where the syntax has no access to []_F-marking at all. But like correlations between thematic roles and syntactic structure, there may be strong default correlations which may become grammaticized and then take on a life of their own. It would probably be fruitful to investigate both the broad correlations and the language-specific differences in grammaticization. And quantification appears to be a very fruitful domain for investigating such correlations, undoubtedly expanding our understanding of quantification in the process.

Acknowledgements

I am grateful first of all to Petr Sgall and Eva Hajičová and their colleagues and students at the Charles University in Prague, both for their wonderful hospitality during my stay there during the momentous fall of 1989 and for our many hours of (not only) linguistic discussions, the linguistic parts of

which not only helped me overcome my initial nervousness about even trying to broach the area of topic and focus but gradually led me to the view that I could not continue to work responsibly in the area of the semantics of quantification without paying active attention to the phenomena which the Prague school linguists have been studying for many years under such names as "functional sentence perspective", "topic-focus articulation", and "scale of communicative dynamism". We hope to eventually write a joint article on these issues, but this isn't yet that.

The earliest version of the present paper was presented as my last seminar presentation in Prague in January 1990; subsequent presentations were made in a seminar on focus conducted by Angelika Kratzer, Irene Heim and Ede Zimmermann at UMass, Amherst, in February 1990; in a seminar at El Colegio de México in the spring of 1990; at a colloquium at Brown University in September 1990; at a UMass colloquium in March 1991; at the SALT conference at Cornell in April 1991 [this volume]; and as a Forum Lecture at the Linguistic Institute at UC Santa Cruz in July 1991. I have benefitted enormously from challenges, questions, ideas, and references provided by students and colleagues, many much more knowledgeable about focus than I and most generous and sympathetic in helping me to find accessible entryways into this area where I still feel in many respects an amateur. Besides Professors Hajičová and Sgall, my greatest debt is to Angelika Kratzer; I am also grateful for comments and suggestions received from Jaroslav Peregrin, Pavel Materna, Tomás Vlk, Irene Heim, Josefina García Fajardo, Elisabeth Selkirk, Roger Higgins, Leonard Babby, Susan Rothstein, Fred Landman, Manfred Krifka, Stephen Isard, Chris Barker, Minoru Nakau and Julia Hirschberg.

I was also fortunate to have the chance to hear Mats Rooth, Manfred Krifka, and Angelika Kratzer talk about their most recent work on focus on separate occasions during the spring of 1991 (Krifka at the SALT conference itself), not in time to have very much effect on the presentation I made at Cornell, but in time to influence my July presentation and the present writeup.

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Under great pressure of time, Angelika Kratzer managed to read most of the draft of this paper and gave me valuable

comments; time constraints and being away from home made it impossible for me to follow up as I would have like to on many of her suggestions, and I bear full responsibility for remaining inadequacies.

FOOTNOTES

1. Julia Hirschberg (p.c.) was not convinced by my oral presentation of the counterfactual case in Santa Cruz in July 1991 that the counterfactual case is really a truth-conditional effect. Here I have tried to construct scenarios in which either sentence could be felicitously used, but one of them would be true and the other false, to try to make it convincing that the difference really does directly affect truth-conditions. But of course it is still possible that the effect is an indirect one. If one thinks of the Lewis or Stalnaker or Kratzer treatments of counterfactuals, it is clear that where focus has its effect in these examples is in how we partition the relevant possible worlds to see what is true in those that are closest to the actual one; in one case we presumably compare worlds where Clyde marries Bertha to worlds where he marries someone else, holding constant his getting married, and in the other case we hold constant Clyde's having some sort of relationship with Bertha and vary the particular relationships.

An explicit analysis of the interaction of focus with the semantics of counterfactuals can be found in Kratzer (1989a); see that paper for fuller discussion of the sorts of cases mentioned here and careful attention to many difficulties and complications that I am neglecting here.

Rooth (ms. 1991) in fact suggests making all association with focus effects somewhat more indirect than they were in the treatment of Rooth 1985; I will continue here to count as truth-conditional effects of association with focus all those cases for which I believe there are truth-conditional differences and for which I cannot see an explanation of them as a byproduct of some other kind of disambiguation effect.

2. Lauri Karttunen suggested after my July talk in Santa Cruz that Yes-No questions should perhaps also be regarded as focus sensitive, on the grounds that while a pair like (1a-b) would not differ in their answers if the answer were "yes", they would differ in their "no" answers, since a full "no" answer would normally be construed differently in the two cases, as in (1a-b).

- (i) (a) Did you send your BROTHER to Paris?
- (b) Did you send your brother to PARIS?

- (ii) (a) No, I didn't send my BROTHER to Paris.
 (b) No, I didn't send my brother to PARIS.

At the time I rejected this as an argument that Yes-No questions should be construed as truth-conditionally focus-sensitive, arguing that the relevant notion of truth-conditional effects for questions is just what constitutes a true answer, and that for Yes-No questions the issue is just whether the true answer is "yes" or "no". In the case of a "No" answer, filled out into a full sentence with preservation of the original focus structure, one would indeed expect further contrasting information (e.g. "rather my cousin" vs. "rather to London"), but this could simply reflect the pragmatic influence of the differing sets of alternatives evoked by the different focus structures: a helpful answerer will try to provide further information relevant to the speaker's interests as signalled by the choice of focus.

But I am not fully content with the answer I gave then, since on the one hand negation is normally considered to be an operator that associates with focus, but the same sorts of arguments I just gave would seem to show that the effect of focus on negation is not truth-functional. But Heim and Kratzer have argued that negation may often carry implicit quantificational force, in which case it can be truth-functionally affected by focus, but perhaps not in examples like the preceding. At this point I am hampered by not having Kratzer 1989a with me; I know there is an explicit analysis of negation with relevant discussion there, and I think there are examples that would come out with different truth-conditions under different focus structures, but I don't remember what they are and so can't test to see if they can be converted into yes-no questions for which a difference in focus could lead to a "yes" answer for one and a "no" answer for the other.

REFERENCES

- Ahn, Sung-Ho (ms.1989) "Restrictive Terms", Ling. Inst., Tucson, and U.Conn.
 Barwise, J., & Cooper, R. (1981) "Generalized Quantifiers and Natural Language," Linguistics and Philosophy 4, 159-219.
 Berman, S. (1987) "Situation-based semantics for adverbs of quantification", WCCFL 6.
 Berman, S. (1989) "An Analysis of Quantificational Variability in Indirect Questions", MIT Working Papers in Linguistics 11.
 Berman, S. (1991) On the Semantics and Logical Form of Wh-Clauses Ph.D. dissertation University of Massachusetts.

- Bromberger, S. (1987) "What we don't know when we don't know why", in N. Rescher, ed., Scientific Inquiry in Philosophical Perspective, Univ. Press of America (75-104).
- Carlson, G. (1979) "Generics and Atemporal When," Linguistics and Philosophy 3, 49-98.
- Carlson, L. (1983) Dialogue Games: an Approach to Discourse Analysis. Dordrecht:Reidel.
- Chierchia, G. (1988) "Dynamic Generalized Quantifiers and Donkey Anaphora", in M. Krifka, ed., Genericity in Natural Language, Univ. of Tübingen.
- Chomsky, N. (1971) "Deep structure, surface structure, and semantic interpretation", in D. Steinberg and L. Jakobovits, eds., Semantics. Cambridge: Cambridge University Press (183-216).
- Cresswell, M.J. and A. von Stechow (1982) "De re belief generalized", Linguistics and Philosophy 5, 503-535.
- Dahl, O. (1974) "Topic-comment structure revisited", in Dahl (ed.), Topic and Comment, Contextual Boundedness and Focus, Hamburg: Buske Verlag.
- Diesing, M. (1989) "Bare Plural Subjects, Inflection, and the Mapping to LF", in Bach, Kratzer, and Partee, eds., Papers on Quantification, NSF report, UMass, Amherst.
- Dretske, F. (1972) "Contrastive Statements", Phil. Review, 411-437.
- Dretske, F. (1975) "The Content of Knowledge", in B. Freed et al (eds.), Forms of Representation, North-Holland, Amsterdam, 77-93.
- Farkas, D. F., & Sugioka, Y. (1983) "Restrictive if/when-clauses," Linguistics and Philosophy 6, 225-258.
- Frege, Gottlob (1892) "Über Sinn und Bedeutung", Zeitschrift für Philosophie und philosophische Kritik 100 (25-50). English translation, "On sense and reference" in P.T. Geach and M. Black eds., Translations from the philosophical writings of Gottlob Frege. Oxford: Blackwell, 1952 (56-78).
- Groenendijk, J. and M. Stokhof (1990), "Dynamic Montague Grammar", in L. Kalman and L. Polos (eds.) Papers from the Second Symposium on Logic and Language, Akademiai Kiado, Budapest, 3-48.
- Groenendijk, J. and M. Stokhof (1991), "Dynamic Predicate Logic", Linguistics and Philosophy 14.
- Gussenhoven, C. (1984) On the Grammar and Semantics of Sentence Accents, Foris, Dordrecht.
- Haiman, J. (1978) "Conditionals are Topics," Language 54, 564-589.
- Hajičová, E. (1973) "Negation and Topic vs. Comment", Philologia Pragensis 16, 81-93.
- Hajičová, E. (1983) "Topic and Focus", Theoretical Linguistics 10, 268-276. (Also in P. Sgall, ed. (1984), 189-202.)

- Hajičová, E. (1984a) "Presupposition and Allegation Revisited", Journal of Pragmatics 8, 155-167.
- Hajičová, E. (1984b) "On Presupposition and Allegation", in P. Sgall, ed. (1984), 147-188. [modified version of Hajičová 1984a]
- Hajičová, E. and P. Sgall (1987) "The Ordering Principle", Journal of Pragmatics 11, 435-454.
- Halliday, M.A.K. (1970) A Course in Spoken English: Intonation, Oxford University Press, Oxford.
- Hamblin, C.L. (1973) "Questions in Montague grammar", Foundations of Language 10, 41-53. Reprinted in B. Partee (ed.) Montague Grammar, N.Y.: Academic Press, 247-259.
- Heim, I.R. (1982) The Semantics of Definite and Indefinite Noun Phrases, Ph.D. dissertation, University of Massachusetts, Amherst. Heim, I.R. (1983) "On the projection problem for presuppositions", WCCFL 2, Stanford, CA: Stanford Linguistics Association.
- Jackendoff, R. (1972) Semantic Interpretation in Generative Grammar, Cambridge, MA: MIT Press.
- Jacobs, J. (1983) Fokus und Skalen. Zur Syntax und Semantik von Gradpartikeln im Deutschen Tuebingen: Niemeyer.
- Jelinek, E. (1988) "Quantification Without Nouns in Salish" presented at Symposium on Cross-Linguistic Quantification, LSA 1988
- Kamp, H. (1981) "A Theory of Truth and Semantic Representation," reprinted in J. Groenendijk, T.M.V. Janssen and M. Stokhof, eds. (1984) Truth, Interpretation and Information, GRASS 2, Foris, Dordrecht.
- Koktova, E. (1986) Sentence Adverbials, John Benjamins, Amsterdam.
- Koktova, E. (1987) "On the Scoping Properties of Negation, Focusing Particles and Sentence Adverbials", Theoretical Linguistics 14, 173-226.
- Kratzer, A. (1980) "The Notional Category of Modality," in H. J. Eikmeyer and H. Rieser, eds., Words, Worlds and Contexts: New Approaches in Word Semantics, de Gruyter, Berlin.
- Kratzer, A. (1986) "Conditionals," In A.M.Farley et al, eds., Papers from the Parasession on Pragmatics and Grammatical Theory, CLS 22.
- Kratzer, A. (1989a), "An investigation of the lumps of Thought", Linguistics and Philosophy 12, 607-53.
- Kratzer, A. (1989b) "Stage-Level and Individual-Level Predicates" in Bach, Kratzer, and Partee, eds., Papers on Quantification, NSF report, UMass. Kratzer, A. (ms. 1989) "The representation of focus", handout, Ling. Institute, Univ. of Arizona, Tucson.
- Kratzer, A. (1991a) "Pseudo-scope", talk given at ASL/LSA Conference on Logic and Linguistics, Santa Cruz.

- Kratzer, A. (ms. 1991) "Focus tutorial", handout, Linguistic Institute, UC Santa Cruz.
- Krifka, M. (this volume) "A compositional semantics for multiple focus constructions", Univ. of Texas, Austin.
- Landman, F. (1986) "Pegs and Alecs" in F.Landman, Towards a Theory of Information, GRASS 6, Foris, Dordrecht.
- Lee, Hyunoo (ms.1989) "Towards a Formal Characterization of the Korean Topic Construction", Linguistic Institute, Tucson, and UCLA.
- Lewis, D. (1970) "General semantics", Syntheses 21.
- Lewis, D. (1973) Counterfactuals, Blackwell, Oxford.
- Lewis, D. (1975) "Adverbs of Quantification," in E. L. Keenan, ed., Formal Semantics of Natural Language, Cambridge University Press.
- Materna, P., Hajičová, E. and Sgall, P. (1987), "Redundant Answers and Topic/Focus Articulation", Linguistics and Philosophy 10, 101-113.
- Milsark, G. (1977) "Toward and explanation of certain peculiarities of the existential construction in English", Linguistic Analysis 3, 1-30.
- Montague, R. (1973) "The Proper Treatment of Quantification in Ordinary English," in Montague (1974), Formal Philosophy, Yale University Press.
- Partee, B. (1988) "Many Quantifiers", Proc. of ESCOL '88.
- Partee, B. (1989) "Binding Implicit Variables in Quantified Contexts", CLS 25
- Partee, B., E.Bach, and A.Kratzer (1987) "Quantification: A Cross-Linguistic Perspective", NSF proposal, UMass, Amherst.
- Roberts, Craige (1990) "Domain Restriction in Dynamic Semantics", talk presented at the Symposium on Logic and Language, Revfülp, Hungary, August 27, 1990.
- Rochemont, M. (1986) Focus in Generative Grammar, John Benjamins, Amsterdam.
- Rooth, M. (1985) Association with Focus, Ph.D. diss., UMass, Amherst.
- Rooth, M. (ms.1989) "Indefinites, Adverbs of Quantification, and Focus Semantics"
- Rooth, M. (handout 1991) "A Restrictive Theory of Focus Interpretation, or What is the Source of Association with Focus Ambiguities?", talk, UMass, Amherst, April 1991.
- Schubert, L. and F.J.Pelletier (1988) "Generically Speaking, or, Using Discourse Representation Theory to Interpret Generics", in Chierchia, Partee, and Turner, eds., Properties, Types, and Meaning, v.2, Reidel.
- Schwarzschild, R. (1989) "Adverbs of Quantification as Generalized Quantifiers", NELS 19.
- Sekirk, E. (1984) Phonology and Syntax: The Relation Between Sound and Structure, MIT Press, Cambridge.

- Sgall, P.(ed.) (1984) Contributions to Functional Syntax, Semantics, and Language Comprehension, Academia, Praha.
- Sgall, P., E. Hajičová, and J. Panevová (1986), The Meaning of the Sentence in Its Semantic and Pragmatic Aspects, Academia, Prague and Reidel, Dordrecht.
- Stalnaker, R. (1978) "Assertion", in P. Cole (ed.) Syntax and Semantics 9, Academic Press, New York.
- Stump, G. (1985) The Semantic Variability of Absolute Constructions, D. Reidel Publishing Company, Dordrecht.
- Szabolcsi, A. (1981a) "The Semantics of Topic-Focus Articulation", in J. Groenendijk, T. Janssen, M. Stokhof (eds.), Formal Methods in the Study of Language, Part 2, Mathematisch Centrum, Amsterdam (513-540).
- Szabolcsi, A. (1981b) "Compositionality in Focus", Folia Linguistica 15, 141-161.
- Szabolcsi, A. (1983) "Focussing properties, or the trap of first order", Theoretical Linguistics 10.
- Vallduví, Enric (1990) The Informational Component, Ph.D. dissertation, University of Pennsylvania.
- Vlk, T. (1988a) "Topic/Focus Articulation and Intensional Logic", in D. Vargha (ed.), COLING'88, ACL, Budapest. 720-725.
- Vlk, T. (1988b) "Towards a Transduction of Underlying Structures Into Intensional Logic", The Prague Bulletin of Mathematical Linguistics 50, 35-70.

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