

# Information Structure and Theoretical Models of Grammar\*

Ingo Reich

October 31, 2010 (*preliminary draft*)

## 1. Relevance to grammar

The title of this chapter strongly suggests that information structural notions like topic, comment, focus or background should, in some way or other, form an integral part of any adequate theory of grammar. – But why should this actually be so? After all, information structural notions such as focus heavily depend on their context of use. Consider (1) and (2).

- (1) a. Who did you sell your typewriter to?  
b. I sold my typewriter *to CLYDE*.
  
- (2) a. What did you sell to Clyde?  
b. I sold *my TYPEwriter* to Clyde.

If the sentence *I sold my typewriter to Clyde* is uttered as an answer to (1a), the PP *to Clyde* is stressed, with an accent on *CLYDE*. However, if it is uttered as an answer to (2a), stress ‘shifts’ to the NP *my typewriter*, with an accent on *TYPEwriter*. Thus it seems that the locus of the pitch accent cannot be predicted without taking the context of use into account. And what is more, the difference in focal stress affects neither the sentence’s syntax nor its semantics: Any situation in which I sold my typewriter *to CLYDE* is a situation in which I sold *my TYPEwriter* to Clyde, and vice versa. Thus, apparently, a shift in focus leaves the truth-conditions of the

---

\* I would like to thank Manfred Krifka, Renate Musan and Marga Reis for very helpful discussion and suggestions. Thanks also to Kirsten Brock for checking my English. All remaining errors are, of course, my own.

sentence untouched and only concerns the level of pragmatic interpretation.

### 1.1. Relevance to semantics

Or so it seems. Dretske (1972), from whom I borrowed and slightly adapted the above *typewriter*-example, argues, firstly, that even though (1b) and (2b) are truth-conditionally equivalent, these statements differ in contrast: Intuitively, (1b) contrasts with statements like *I sold my typewriter to Alex*, whereas (2b) contrasts with statements like *I sold my adding machine to Clyde*. This intuition is supported by the observation that it is perfectly fine to continue (1b) with the phrase *not to Alex*, but somehow inadequate to continue it with *not my adding machine*. And what is more, Dretske (1972: 412) argues that “if  $C(U)$  is a linguistic expression in which  $U$  is embedded, and  $U$  can be given different contrastive foci (say  $U_1$  and  $U_2$ ), then it often makes a difference to the meaning of  $C(U)$  whether we embed  $C(U_1)$  or  $C(U_2)$ .” Consider (3).

- (3)     a. I only sold my typewriter *to CLYDE*.  
          b. I only sold *my TYPE*writer to Clyde.

In (3), the contrastive statements (1b) and (2b) are part of the slightly more complex statements (3a) and (3b) respectively, which contain, in addition, the particle *only*. The latter two, of course, differ in truth-conditions: Suppose I am in desperate need of money, and therefore I sold, with the intent to defraud, my typewriter (but nothing else) to two different people, namely Clyde and Alex. In this situation, (3a) is false, but (3b) is true. As Dretske (1972: 423) rightly points out, this truth-conditional effect is not to be taken to show that focus is a semantic phenomenon, but it strongly suggests that there are expressions in natural language that are in one way or another sensitive to focus: “We could easily take it as an argument for the view that certain pragmatic differences [...] are relevantly involved in the semantical analysis of certain expressions in which they can appear.” Thus it is not necessarily focus itself but rather its interaction with focus-sensitive expressions like *only* that matters to semantics.

With respect to particles like *only* it is common to say that *only* ‘associates’ with the focus in its scope, leaving unsettled the question of how direct the connection between *only* and the focus in fact is. Another, more direct way to put it is to say that *only* ‘binds’ the focus in its scope (similar to a quantifier binding a pronoun). The foci in (3a) and (3b) are, then, called ‘bound’ foci, while the foci in (1b) and (2b) are instances of ‘free’ focus. By and large, this difference in

terminology corresponds to a distinction between ‘weak’ and ‘strong’ approaches to focus (see especially Beaver and Clark 2003, 2008), a distinction that is, as we will see in detail below, at the heart of the debate on association with focus.

Within the range of free foci, it might be necessary to further distinguish contrastive or, more generally, alternative focus from focus that is determined so to speak ‘ex negativo’ by a phenomenon usually called deaccentuation. Consider (4).

- (4)     Where’s your typewriter?  
a. I (#only) *SOLD* my typewriter.  
b. I (#only) sold my typewriter *to CLYDE*.

As an answer to the question *Where’s your typewriter?*, (4a) is most naturally pronounced with stress on *sold*. Intuitively, this accent pattern is very similar, if not identical, to the accent pattern (4a) receives as an answer to *What did you do with your typewriter?*. The latter case, like the cases in (1) – (3), we already know as a case of contrastive focus. The former case, however, seems to be different in several respects: First, there is no intuition whatsoever that *sold* in (4a) contrasts with, say, *gave*. It rather seems that *sold* is stressed simply because *my typewriter* is not; and *my typewriter* is not stressed simply because it has already been mentioned in the context of the question. This is corroborated by two observations: Firstly, in (4b) stress shifts back to the end of the sentence, falling on *Clyde* rather than on *sold*. Secondly, neither in (4a) nor in (4b) is it possible to associate the focus with *only*. But if we relate (4a) and (4b) to the question *What did you do with your typewriter?*, association with *only* seems to be possible again.

Alternatively, one may consider the stress pattern in (4a) as evidence that the question *Where’s your typewriter?* is not answered directly, but rather indirectly by directly answering an implicit question like *What did you do with your typewriter?*, the answer to the latter question implying an answer to the former question. The case is similar in (4b). This allows, on the one hand, a uniform treatment of all focus phenomena. On the other hand, it requires an elaborate theory of (implicit and explicit) context questions or ‘questions under discussion’ (see also the introduction to this book and section 3.1 below), which furthermore needs to provide an explanation for the fact that *only* does not associate with the relevant focus in more indirect cases.

Whatever the correct analysis, the latter fact suggests that the foci in (4) should not be dealt with within semantics proper. Similar considerations apply to the notion topic: Intuition

tells us that an utterance of (4a) in the context of *Where's your typewriter?* is a statement about the typewriter (e.g. Reinhart 1981). The notion of aboutness, however, encodes some specific perspective on or processing of a given state of affairs, and thus does not affect truth-conditions. There may be one exception, though: contrastive topics. Consider (5).

- (5) a. All of my friends didn't *COME*.  
b.  $\sqrt{\text{ALL of my friends DID}} \setminus \text{'t come}$ .

An utterance of (5a) with a default accent on the sentence-final verb *come* is preferably taken to be about *all of my friends* and to state for all of them that they didn't come. (5b), however, with (rising) stress on *all (of my friends)* as well as (falling stress) on *did* is also understood to be about *all of my friends*, but its interpretation differs crucially from that of (5a): (5b) states that it is not the case that all of my friends came (suggesting that in fact most did), i.e. the negation *not* outscopes the universal quantifier *all (of my friends)* (e.g. Büring 1997; Jacobs 1997).

## 1.2. Relevance to phonology

As is apparent from the preceding section, sentence accents are (in many languages) a prominent means to indicate relevant aspects of information structure, and thus intonational phonology plays a crucial role in any theory on information structure (see e.g. Pierrehumbert and Hirschberg, 1990). This is most evident with contrastive topics. As (5b) suggests, contrastive topics typically come with two different pitch accents, a rising accent (on *all*), and a falling accent (on *did*). The rising accent – also called a B accent in Bolinger (1965) and Jackendoff (1972) – is in fact special in that it is – more precisely – a fall rise or 'root' contour, as indicated with the math root symbol  $\sqrt{\quad}$  in (5b). This B accent (marking contrastive topics) needs to be distinguished from the pitch accent marking contrastive (alternative) focus in English, an A accent in Bolinger's terminology. Also consider Jackendoff's (1972: 261) famous 'Fred ate the beans'-example (6).

- (6) a. Well, what about *Fred*? What did *he* eat?  
b.  $\sqrt{\text{FRED}}$  (B) ate the *BEANS* \ (A).

In (6b) we find a fall-rise (B accent) on *Fred*, and a fall (A accent) on *beans*. Together they form a so-called hat or bridge contour (Cohen/'t Hart 1967; Féry 1993; Jacobs 1997). As Jackendoff

(1972: 262) observes, B accents are also found with ‘topicalized’ phrases as in (7).

- (7) a. *B*Agels (B), I don’t like to *EAT* (A).  
b. As for *FRED* (B), I don’t think *HE* (B) can *MAKE* (A) it.

Jackendoff (1972: 262) furthermore observes that A accents are, in a sense, secondary: “The B accent occurs on the variable whose value is chosen first, the one which [the] speaker [...] is asking about. The A accent occurs on the variable whose value is chosen second, so as to make the sentence true for the value of the other variable.” The fact that A and B accents differ in phonetic realization as well as in semantic interpretation strongly suggests that they are genuinely different. If this is in fact correct, then both notions – contrastive topic *and* contrastive focus – are of immediate relevance to phonology.

On the other hand, both accents are pitch accents. And, what is more, B accents seem to be parasitic on A accents in the sense that they are realized only if an A accent is; see (8b) vs. (8c). A accents, in contrast, can very well live a life of their own (8a).

- (8) a. *B*Agels (A), I don’t like.  
b. \**B*Agels (B), I don’t like.  
c. *B*Agels (B), I *DON’T* (A) like.

Note also that B accents (almost) always precede A accents, and that the relevant intonational pattern is well known from other phenomena, like gapping or answers to multiple *wh*-questions. So chances are good that A and B accents are in fact two sides of the same coin, the observed differences in realization being due to linearization or hierarchization effects (see e.g. Pierrehumbert and Hirschberg 1990; Bartels 1999; Féry 2007, for discussion).

Following the above arguments, let us suppose that contrastive topics are in fact (semantically and phonologically) special instantiations of the phenomenon called contrastive (or alternative) focus above. If this is on the right track, then it is entirely sufficient to mark contrastively focused phrases with an F in syntax, as for example in (9b) below, and to state corresponding rules for semantic interpretation and phonological realization.

- (9) a. I sold *my TYPEwriter* to Clyde.  
b. I sold [my typewriter]<sub>F</sub> to Clyde.

On the level of semantic or pragmatic interpretation, F-marked constituents give rise to contrastive (alternative) interpretations. Details will be given below. On the level of phonological interpretation each F-marked constituent is – in languages like English, German or French – assigned a pitch accent, which is realized according to independently given and partly language specific rules for stress assignment (including the poorly understood rules for “focus projection,” which I can not go into detail here for reasons of space and a strong focus on the semantic aspects of the matter; but see e.g. Selkirk, 1996, for discussion).

This is essentially what is proposed in Jackendoff (1972) and what has become standard within generative approaches to information structure since then. Jackendoff himself calls this F-marker “artificial,” and one may wonder whether we could in fact do without such a marker for contrastive focus, the more so as we have just argued above that there is (probably) no need for a special T-marker to indicate contrastive topics (though it might turn out to be necessary to mark *aboutness* topics this way). There would be no need for a special F-marker for contrastive focus, of course, if contrastive focus were just an epiphenomenon of deaccentuation and, thus, givenness. As the discussion of the data presented in (4) suggests, this seems quite unlikely. Further evidence comes from so-called *second occurrence focus* (SOF). Consider (10), taken from Beaver et al. (2007), who adapted it from Partee (1999).

- (10) a. Me: Everyone already knew that Mary only eats [vegetables]<sub>F</sub>.  
b. You: If even [Paul]<sub>F</sub> knew that Mary only eats [vegetables]<sub>SOF</sub>,  
then he should have suggested a different restaurant.

In (10a) the object *vegetables* is contrastively focused, and associates with the focus particle *only*. The contrastive focus on *vegetables* is, as usual, marked by a pitch accent. (10b) echos the VP *knew that Mary only eats vegetables* as part of a larger utterance, and, in this sense, the VP is given in (10b). What we observe is that this second occurrence of the VP is completely deaccented, i.e. no pitch accent is assigned to or within the VP. This comes somewhat as a surprise if we assume that contrastive focus and deaccentuation are in fact two (strictly) independent phenomena. However, in an experimental study Beaver et al. (2007) showed that

contrastive focus on second occurrence expressions like *vegetables* in (10b) is still marked phonologically, though by a significant increase in length and intensity rather than by an increase in pitch. This, in turn, would be completely unexpected if contrastive focus was just to be negatively construed as that part of a sentence that escapes deaccentuation, simply for not being known or given in the relevant context. It rather seems that deaccentuation of second occurrence expressions forces contrastively focused phrases to be phonologically marked in a way consistent with the process of deaccentuation. These experimental results thus support considering contrastive focus and deaccentuation as two essentially different (but nevertheless related) phenomena.

### 1.3. Relevance to syntax

Whether this also implies the existence of F-markers in syntax is a completely different matter. But as long as we take syntax to mediate between semantics and phonology, F-markers are a handy technical device to ensure that contrastively interpreted phrases receive phonological prominence, even though semantics and phonology do not ‘talk to each other’ directly.

In a feature-driven syntax, of course, F-markers could play a crucial role in accounting for genuinely syntactic phenomena like movement processes. In Hungarian, for example, contrastively focused constituents are moved into a preverbal position; compare the postverbal neutral *Marival* in (11a) with the preverbal focused *Marival* in (11b) (see e.g. Kiss 1987, 2007, and Gyuris, this volume). The preverbal focus is interpreted exhaustively (see e.g. Szabolsci 1981).

- (11) a. *össze vezett János Marival*  
 out fell John Mary-with  
 ‘John fell out with Mary.’
- b. *János Marival vezett össze*  
 John Mary-with fell out  
 ‘It was Mary who John fell out with.’

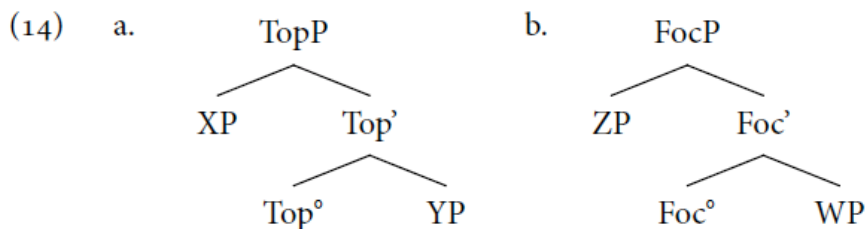
Similar observations have been made for other languages. In Italian, see (12a), as well as in English, see (12b) (see also Winkler, this volume, for discussion), the contrastively focused constituent may be moved to a left-peripheral sentence position, where it is typically interpreted as the one and only alternative of which the predication is true (see Rizzi 1997).

- (12) a. *Il tuo libro* ho letto (non il suo).  
 b. *Your book*, I have read (not his).

In fact it is not only contrastively focused phrases that move to a left-peripheral sentence position, but also topics like *János* in (11b). In languages like Italian or German left dislocation is one of the most prominent means of marking topics syntactically; see (13).

- (13) a. *Il tuo libro*, lo ho letto. (Your book, I have read it)  
 b. *Dein Buch*, das habe ich gelesen. (Your book, I have read it)

This tendency to push topical and focal expressions towards the sentence's left periphery may suggest that its primary task is to interface with discourse. As Rizzi (1997: 283) puts it “we can think of the complementizer system as the interface between a propositional content (expressed by the IP) and the superordinate structure (a higher clause or, possibly, the articulation of discourse, if we consider a root clause). As such, we expect the C system to express at least two kinds of information, one facing the outside and the other facing the inside.” Rizzi (1997, 2004) proposes that propositional contents are integrated into discourse via two functional projections, the topic phrase TopP and the focus phrase FocP:



The functional head Top° defines, according to Rizzi (1997: 286), some kind of ‘higher predication,’ where YP comments on the topic XP. The head Foc°, Rizzi takes to partition the projection FocP into a focal part ZP and a presuppositional part WP. Reconsidered from this perspective, the Hungarian data discussed above suggests that TopP is systematically to the left of FocP. To substantiate this proposal, Rizzi (1997) argues in great detail that this structural refinement of the left periphery helps to explain, for example, the relative distribution of finite

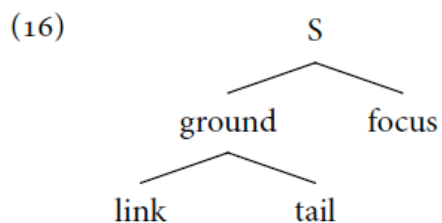


(e.g. Italian *che*) and infinite (e.g. Italian *di*) complementizers and topics in Romance languages as well as several adjacency effects. In a similar vein, Frey (2000, 2004) argues for a topic position in German, located at the left periphery of the ‘middle field,’ to the right of the C system and to the left of sentence adverbials like *wahrscheinlich* (‘presumably’); see (15).

(15) I’ll tell you something about Otto.

- a. *Nächstes Jahr wird Otto wahrscheinlich Anna heiraten*  
 next year will Otto presumably Anna marry  
 ‘Next year, Otto will presumably marry Anna.’
- b. #*Nächstes Jahr wird wahrscheinlich Otto Anna heiraten.*

Since (the topmost) TopP is located above FocP, the “cartographic” approach put forward by Rizzi and others does not necessarily imply topics to be old information. This is different in Vallduví’s (1990, 1992) information packaging approach, which partitions sentences into focus and ground, and ground into link and tail. Roughly speaking, ground corresponds to the presuppositional part of a sentence, and link to the topic. More precisely speaking, “[t]he knowledge encoded in the ground portion of a communicated proposition is knowledge the speaker assumes that the hearer already possesses [...] A link is an address pointer in the sense that it directs the hearer to a given address [...] in the hearer’s knowledge store under which the information carried by the sentence is entered. Pointing to this address is part of the information anchoring role of the ground. By starting a sentence with a link speakers indicate to hearers that the focus must be entered under the address denoted by that link, i.e. that hearers must go to that address [...] and enter the information under its label” (Vallduví 1990: 58). According to Vallduví (1990, 1992) links are always left peripheral (though structurally subordinate); see (16).



It should be noted, however, that in contrast to the cartographic approach of Rizzi (1997) the

partitioning of a sentence into focus, link and tail as given in (16) does not parallel the syntactic structure of the sentence. Rather, Vallduví (1990, 1992) stipulates another level of syntax, information structure (IS), which builds on S-structure and feeds logical form (LF), which in turn feeds semantics. On IS, focus constitutes the core of the sentence (the core IP), while link and tail are detached.

Like Vallduví (1990, 1992), Erteschik-Shir (1997, 2007) also argues for an information structural level of syntax, which she calls f-structure. In contrast to Vallduví (1990, 1992), however, she furthermore argues that f-structure should in fact be considered a substitute for LF, it being directly interpreted by semantics (and phonological form). Consider (17) and (18).

- (17) a. Who ate the candy?  
b.  $TOP_i$  [ [the children]<sub>FOC</sub> ate [the candy]<sub>i</sub> ]

- (18) a. Who did everyone talk to?  
b. Who did everyone<sub>TOP</sub> [talk to  $t$ ]<sub>FOC</sub>?

On f-structure, topics and foci are marked syntactically. In the context of (17a), for example, the answer *the children ate the candy* is assigned the f-structure in (17b): *the candy* is marked as topic, *the children* is marked as focus, and *ate* is presupposed. Even though the topic *the candy* stays in situ, it is given wide scope by relating it to the topic operator TOP. The generalization that topics always get widest scope also accounts for the tricky pair-list reading (“Tell me for everyone: Who did she talk to?”) of (18a). This suggests that matters of quantifier scope can in fact be taken care of on f-structure.

Since focus is in Vallduví’s as well as in Erteschik-Shir’s approach not intimately tied to the left periphery of the sentence, these approaches are rather well suited to deal with Scrambling in so-called ‘free word order languages’ like Russian, German or Hindi. Consider (19).

- (19) a. [Wem]<sub>IO</sub> hast du [das Geld]<sub>DO</sub> gegeben?  
‘Who did you give the money to?’  
b. Ich habe [das Geld]<sub>DO</sub> [dem Kassier]<sub>IO</sub> gegeben.  
‘I gave the money to the treasurer.’

German *geben* ('give') is usually taken to have as its unmarked word order 'indirect object (IO) before direct object (DO)'; see e.g. Höhle (1982). Still, in the context of (19a) the inverse word order is perfectly fine; see (19b). This could be due to two reasons. Either the direct object *das Geld* ('the money'), being the topic of the sentence, pushes to the left, or *dem Kassier* ('the treasurer'), being its focus, pushes to the right. Anyway, the fact of the matter is that the focus ends up at the right periphery of the German middle field (see also Musan 2010).

This is somewhat unexpected within Rizzi's (1997, 2004) cartographic approach, for pushing the focus to the right increases the distance between its overt position and the position of the specifier of FocP, to which the focus needs to be moved covertly for matters of semantic or pragmatic interpretation (the focus syntactically partitioning the projection FocP into a focal and a presuppositional part). This is not to say, of course, that it is impossible to account for Scrambling within the cartographic approach. Rather the facts suggest that we are dealing with two essentially independent phenomena, each requiring a different treatment, i.e. contrastive focus and, once again, deaccentuation. Left-dislocated foci systematically show a contrastive interpretation that can be strengthened to an exhaustive interpretation in some syntactic contexts. If we suppose that there is in fact some functional projection FocP at the sentence's left periphery (but see e.g. Fanselow, 2007; Sternefeld, 2006, for discussion), it thus seems straightforward to restrict movement to the specifier of FocP to contrastively interpreted foci. Technically, this can be made sense of by restricting F-markers to only indicating contrastive foci, and to letting Foc attract F-features. Focus negatively determined by deaccentuation, on the other hand, is not subject to direct interpretation, but is rather an epiphenomenon of marking other, surrounding constituents in a sentence as given (in the relevant context). Again, technically, we could stipulate a givenness feature G, marking discourse given constituents in syntax (see e.g. Sauerland, 2004; Wagner, 2007). Second occurrence expressions like, for example, *vegetables* in (10) above are, then, both F-marked (since they associate with a focus particle) and G-marked (since they are reduced in pitch).

## **2. Focus and background in semantics and pragmatics**

### **2.1 Alternative semantics**

This again raises the crucial question of how exactly to interpret F- or G-marked constituents and how to relate them to discourse. To this effect, reconsider Dretske's typewriter example:

- (20) a. What did you sell to Clyde?  
 b. I sold [my typewriter]<sub>F</sub> to Clyde.

As we saw in section 1 above, the focus of (20b) heavily depends on the choice of the question that (20b) is supposed to answer, roughly corresponding to the question's *wh*-phrase. According to Hamblin (1973), question (20a) essentially presents a set of possible answers of the form *I sold x to Clyde* (*x* being any salient object, e.g., *my typewriter*), of which the addressee is supposed to specify all and only the true ones. From this perspective, the focus in (20b) is quite naturally interpreted as relating (20b) to this contextually given set of possible answers, an utterance of (20b) asserting that the proposition *I sold my typewriter to Clyde* is actually a true possible answer to the question (20a), while suggesting that all other alternatives are wrong.

This is in essence the fundamental idea of alternative semantics as proposed in several works by Rooth (1985, 1992, 1996) as a means to interpret focus. In contrast to *wh*-phrases, however, focus, by itself, does not (directly) affect truth-conditions, which is why Rooth suggests interpreting focus on a second level of interpretation  $[[\cdot]]_F$ , different from, but related to the usual level  $[[\cdot]]$ . On this second level, focused constituents like  $[my\ typewriter]_F$  locally introduce a set of alternatives to (the denotation) of *my typewriter*, including (the denotation of) *my typewriter* itself. This second dimension of interpretation is (typo)graphically indicated in (21) by setting the denotation's elements in gray sans serif. These alternatives are then recursively passed on to the sentence level, where they give rise to a set of propositional alternatives; see (22).

- |                                     |  |
|-------------------------------------|--|
| ...                                 | ...  |
| my adding machine                   | I sold my adding machine to Clyde                    |
| (21) [ my typewriter ] <sub>F</sub> | (22) I sold [ my typewriter ] <sub>F</sub> to Clyde. |
| my blue convertible                 | I sold my blue convertible to Clyde                  |
| ...                                 | ...  |

This close relationship to the semantics of *wh*-interrogatives thus enables us to state a (necessary) well-formedness condition on question–answer pairs: A is a well-formed or congruent answer to Q just in case the denotation  $[[Q]]$  of Q is a subset of the focus value  $[[A]]_F$  of A.

Of course, this approach not only copes with matters of question–answer congruence, but also with the semantics of focus-sensitive particles, as Rooth (1985) shows in detail. To keep things simple, suppose (contrary to fact) that on LF *only* operates on a propositional level; see

(23b). The particle *only* thus has local access to both the ordinary semantic value (the proposition *that I sold my typewriter to Clyde*) and the focus semantic value (the set of propositions indicated in (22) above) of its sister node *I sold [my typewriter]<sub>F</sub> to Clyde*, and essentially states that of all relevant alternatives the asserted proposition is the only true one; see (23c).

- (23) a. I only sold [my typewriter]<sub>F</sub> to Clyde.  
 b. only [I sold [my typewriter]<sub>F</sub> to Clyde]  
 c. *only* ([[α]]<sub>F</sub>) ([[α]]) (w) = 1 iff  $\forall p \in [[\alpha]]_F (p(w) = 1 \rightarrow p = [[\alpha]])$

In Rooth (1992) the hitherto implicit link between the focus semantic value of a constituent  $\alpha$  and the ordinary semantics of a focus-sensitive particle like *only* is made explicit by way of anaphora. Suppose that *only* is not directly restricted by the focus semantic value [[α]]<sub>F</sub> of  $\alpha$ , but more generally by some restrictor variable C ranging over sets of propositions. This boils down to the claim that the particle *only* may in fact be restricted by several sources and in different ways at the same time. The crucial task then is to find some systematic and empirically adequate way of linking the restrictor variable C to the focus semantic value [[α]]<sub>F</sub> of  $\alpha$ . This is exactly where the squiggle operator  $\sim$  comes in. By assumption the squiggle operator adjoins to some constituent  $\alpha$  on LF, and relates this constituent to some anaphor  $\Gamma$  of suitable logical type. The relevant LF of example (23a) is thus rather something like (24b) below: The squiggle operator  $\sim$  adjoins to the sister of *only*, and introduces an anaphor  $\Gamma$  ranging over sets of propositions.

- (24) a. I only sold [my typewriter]<sub>F</sub> to Clyde.  
 b. only(C<sub>7</sub>) [ [I sold [my typewriter]<sub>F</sub> to Clyde]  $\sim$   $\Gamma_7$  ]  
 c. *only*(C<sub>7</sub>) ([[α]]) (w) = 1 iff  $\forall p \in C_7 (p(w) = 1 \rightarrow p = [[\alpha]])$

If we furthermore suppose that the variables C and  $\Gamma$  are anaphorically related to each other by way of coindexing (in a Q/A sequence, it is of course the question itself that is coindexed with  $\Gamma$ ), we force C and  $\Gamma$  to denote exactly the same set of propositions. – But what set of propositions does  $\Gamma$  actually denote? The basic idea is that the squiggle operator  $\sim$  locally retrieves the focus semantic value [[α]]<sub>F</sub> of its sister node  $\alpha$ , and requires  $\Gamma$  to denote a subset [!] of this focus semantic value. Since by assumption the coindexed variables C and  $\Gamma$  denote exactly the same set

of propositions, *C* is indirectly restricted to the same subset of the focus semantic value  $[[\alpha]]_F$  as  $\Gamma$  is, and *only* can be taken to quantify over this very subset; see (24c).

This way of construing the semantics of focus-sensitive particles like *only* naturally raises many questions, for example: Why don't we require  $\Gamma$  to be in fact *identical to* the focus semantic value  $[[\alpha]]_F$  of  $\alpha$ ? (After all, this is what the semantics of *only* in (23c) suggests.) And, are there any restrictions on the distribution and the interpretation of the squiggle operator? – As for the first question, note that one of the benefits of the above maneuver is that *C* is, at least in principle, independent from  $\Gamma$ , and thus may (also) be determined by other sources. For example, in a given context, we may want *C* to only include the *salient* propositional alternatives. But if we fixed the denotation of *C* by requiring it to be identical to the semantic value  $[[\alpha]]_F$  of  $\alpha$ , we would lose exactly this flexibility in determining the denotation of *C*. – As for the second question, Rooth (1992) explicitly mentions three constraints on the squiggle operator: First of all, the squiggle operator requires an (unbound) F-marker within its syntactic scope (or, in semantic terms, the cardinality of its sister's focus value is required to be greater than 1). Secondly, the squiggle operator is an unselective focus binder, i.e. the focus semantic value of its mother node is set to the singleton containing its ordinary semantic value. And, last but not least, the squiggle operator has no effect whatsoever on the ordinary semantic interpretation of the LF tree.

One of the strengths of alternative semantics as proposed by Rooth certainly is the fact that focus is interpreted in situ. This correctly predicts island-insensitivity of association with focus; see (25) and e.g. Anderson (1972) and Jackendoff (1972) for discussion.

- (25) a. Dr. Jones only rejected [the proposal that [Bill]<sub>F</sub> submitted]  
b. \*Who<sub>i</sub> did Dr. Jones reject [the proposal that *t<sub>i</sub>* submitted]?

However, as Kratzer (1991) argues, this prediction of alternative semantics is not always borne out. There are relevant counterexamples. Consider her argument based on (26).

- (26) A. What a copycat you are! You went to Block Island because I did. You went to Elk Lake Lodge because I did. And you went to Tanglewood because I did.  
B.  
a. No, I only went to [Tanglewood]<sub>F</sub> because you did  $\Delta$

- b.  $\text{only}(C_7) [ [ [I \text{ went to } [TW]_F] \text{ because } [you \text{ went to } [TW]_F] ] \sim \Gamma_7 ]$
- c.  $\text{only}(C_7) [ [ [TW]_F \lambda 1 [I \text{ went to } t_1 \text{ because you went to } t_1] ] \sim \Gamma_7 ]$

Suppose B rejects A's utterance in (26) with an utterance of (26a). (26a) is a case of VP ellipsis, and from what we know about VP ellipsis, it is rather straightforward to assume that something along the lines of (26b) represents its logical form (within alternative semantics). Since focus is interpreted locally, the focus value of the squiggle's sister node in (26b) contains not only propositions of the form *I went to Elk Lake Lodge because you went to Elk Lake Lodge*, but also propositions of the form *I went to Tanglewood because you went to Block Island*. However, all the latter propositions of the form *I went to x because you went to y*, where *x* is not identical to *y*, are clearly not salient alternatives in the present context. Therefore, the set of alternatives needs to be further restricted. One way to do this is to raise the focused constituent across the board; see (26c). But if we do so movement is involved, and we expect to observe island violations in more complex cases like the one in (27). However, we do not.

- (27) You always contacted every responsible person before me. – No, I only contacted the person who chairs [*the zoning board*]<sub>F</sub> before you did.

Is there some alternative way of dealing with examples like (27), one that does not involve focus movement? As Kratzer (1991) shows, there is. Suppose that there is not only one F-marker marking focus, but in fact a countable set of F-indices  $F_1, \dots, F_n$ . Suppose furthermore that the interpretation of focus is in fact a two-step process: First, we need to build a representation that Jackendoff (1972) calls a "presupposition skeleton" by substituting each F-index  $F_i$  with a focus variable  $v_i$ ; see (28b). In a second step, alternatives are derived with the help of focus variable assignments  $h$  that interpret (exclusively) focus variables  $v_i$  along the lines of (28c).

- (28) a.  $[ [I \text{ went to } [TW]_{F_1}] \text{ because } [you \text{ went to } [TW]_{F_1}] ]$   
 b.  $[ [I \text{ went to } v_1] \text{ because } [you \text{ went to } v_1] ]$   
 c.  $[ [(28b)]_F = \{p; \exists h: p = [[I \text{ went to } v_1 \text{ because you went to } v_1]]^h \}$

As is apparent from (28c), deriving alternatives from a presupposition skeleton mimics variable binding if two or more focus variables within the scope of  $h$  are identical. Though in general we

want any two F-indices in a given tree to be distinct, identity requirements on VP ellipsis force identical F-indices in the case of (26) and (27). The representational view of alternative semantics proposed in Kratzer (1991) thus elegantly derives the correct reading from properties of VP ellipsis interacting with properties of focus interpretation.

Unfortunately, this is not yet the end of the story. As Krifka (1991) points out, the interpretation of second occurrence focus as in (29b) requires selective binding.

- (29) a. John  $only_{F1}$  introduced  $[Bill]_{F1}$  to Mary.  
b. John  $also_{F2}$   $only_{F1}$  introduced  $[Bill]_{F1}$  to  $[Sue]_{F2}$ .

But both Rooth's denotational and Kratzer's representational variants of alternative semantics are unselective in nature, and consequently need to move the focus  $[Sue]_{F2}$  to a position above and out of the scope of *only* in order to prevent this focus from being bound by *only*. This, again, predicts island-sensitivity (see Rooth, 1996, for further discussion).

The lesson we learn from this discussion is that some mechanism of focus interpretation is needed that, firstly, mimics variable binding, and, secondly, does so in an essentially selective fashion. A variant of alternative semantics that meets these requirements is proposed in Wold (1996). Suppose, following Kratzer, that focus is marked with F-indices. Suppose furthermore that each focus is selectively bound by some focus-sensitive operator like *only* or *also* as in (29). From Kratzer's proposal we know that it is straightforward to interpret focused constituents as variables. This can be done via the usual variable assignment  $g$  in the following way: When interpreting an indexed focus-sensitive expression like  $only_{F1}$  in (29a), let us suppose that  $g$  is not yet defined for the index 1, i.e. variable assignments are, in general, partial. Suppose furthermore that if  $g$  is not yet defined for the index 1, the variable assignment is assumed to simply ignore the index F1 on *Bill*, and to return the ordinary semantic value of the focused constituent. This way, *only* has local (and distinguished) access to the ordinary semantic value of its sister node, i.e. to the proposition *that John introduced Bill to Mary*. If, however,  $g$  is defined for the index 1, we suppose that  $g$  interprets the focused constituent  $[Bill]_{F1}$  as denoting the value of  $g$  at this very index (see the definition in (30) below): If  $g$  returns the individual John at index 1, the focused constituent  $[Bill]_{F1}$  is taken to denote John; if  $g$  returns the individual Mary at index 1, the focused constituent  $[Bill]_{F1}$  is taken to denote Mary; and so on, and so forth.



$$(30) \quad [[ [\text{Bill}]_{F1} ]]^g = \begin{cases} g(1) & \text{if } 1 \in \text{dom}(g) \\ \text{Bill} & \text{if } 1 \notin \text{dom}(g) \end{cases}$$

It should be clear by now that this gets us access to the set of alternatives to *John introduced [Bill]<sub>F1</sub> to Mary*: Running through the domain of individuals, we systematically change the value of  $g$  at index 1, and put all resulting propositions in a set  $C$  of alternatives. (Note that, since Bill is one of the relevant individuals, this set contains, amongst others, the proposition *that John introduced Bill to Mary*.) *Only* then is taken to quantify over this set of alternatives and to state that each true proposition in the set  $C$  of alternatives is identical to the proposition we get if we simply ignore the F-index F1 in the scope of *only<sub>F1</sub>*. Thus we can essentially keep the semantics for *only* as proposed by Rooth and others (though in fact *only* now is a universal quantifier quantifying over possible extensions of the assignment  $g$  at index 1).

- (31) a.  $[[\text{only}_{F1} \phi]]^g$  is defined only, if  $1 \notin \text{dom}(g)$ . If defined,  
 b.  $[[\text{only}_{F1} \phi]]^g = 1$  iff  $\forall p \in C(p(w) = 1 \rightarrow p = [[\phi]]^g)$

Since Wold's approach is a selective binding approach, it is able to cope both with Kratzer's Tanglewood example and with Krifka's second occurrence focus example without recourse to covert focus movement. It should be noted, however, that this approach is not really in the spirit of Rooth (1985, 1992) anymore, for the following reason: In Rooth's proposal, it is the F-marker on the focused constituent, and thus, in a sense, the focused constituent itself, that triggers the computation of alternatives. In Wold's proposal, however, the F-index marking the focused constituent is completely ignored as long as it is not bound by some focus-sensitive operator such as *only*. Thus it is, in a sense, the binder, not the bindee that appeals to the notion of alternatives, and in the case of free focus, we are ultimately led to the conclusion that seemingly free focus is in fact bound by some covert (illocutionary) focus-sensitive operator.

## 2.2. Structured propositions

This is essentially what is put forward in Cresswell and von Stechow (1982) and Jacobs (1984), and what is usually called the relational approach to focus interpretation. These analyses, however, are not couched within the general framework of alternative semantics, but within the structured meanings approach as developed in von Stechow (1981, 1982) and Cresswell and von

Stechow (1982), and later taken up and refined in Krifka (1991, 2001) and Reich (2003). The basic idea within the structured meanings approach to focus is that the partitioning of a sentence  $S$  in a focus  $\alpha$  and a background  $\beta$  carries over to semantic interpretation and triggers a structuring  $\langle [[\alpha]], [[\beta]] \rangle$  of the proposition  $[[S]]$  denoted by  $S$ .

By way of illustration, consider (33). Interpreting the focus structure in (33a) results in a structured proposition consisting of the individual *Bill* and the property of being introduced to Mary by John; see (33b). The structuring of the proposition allows local access to both the denotation of the focus and the denotation of the background. And irrespective of whether we take this structured proposition to be computed on a second level of interpretation or whether we take it to represent the ordinary semantic interpretation of (33a), the unstructured interpretation of (32a) is always easily recoverable via functional application  $[[\beta]]([[ \alpha ]])$ .

(32) a. Who did John introduce to Mary?

b.  $\lambda x. \textit{John introduced } x \textit{ to Mary}$

(33) a. John introduced [Bill] to Mary.

b.  $\langle \textit{Bill}, \lambda x. \textit{John introduced } x \textit{ to Mary} \rangle$

Usually, the structured meanings approach builds on a categorial semantics for *wh*-interrogatives which interprets interrogative *wh*-words as  $\lambda$ -binders binding a variable of corresponding type in the position marked by the *wh*-word. Within the categorial approach, a question like (32a) does not denote a set of propositions, but a property, namely the property of being introduced to Mary by John. As is apparent from (32b) and (33b), Q/A congruence then is simply a matter of identity: A (sentential) utterance A is a congruent answer to a question Q if the semantic interpretation of the background of A matches the denotation of Q.

Interpreting focus particles like *only* looks just as easy. Since *only* is focus-sensitive, it operates on the interpretation of the focus structure, i.e. on the structured proposition in question; see (34b). If we stipulate the existence of an alternative function  $\lambda x. \text{alt}_c(x)$  that provides us in a given context  $c$  with the salient alternatives to Bill in  $c$ , then *only* simply states that no alternative to Bill has the property of having been introduced to Mary by John.

- (34) a. John only introduced [Bill]<sub>F</sub> to Mary.  
 b. *only*(⟨Bill, λx. John introduced x to Mary⟩)  
 c. [[*only*]](⟨a, P⟩) = 1 iff  $\forall x \in \text{alt}_c(a)(P(x) = 1 \rightarrow x = a)$

This, of course, raises two questions. Firstly, how exactly do we get from the focus structure (34a) to its interpretation (34b)? And, secondly, is the semantics of *only* essentially equivalent to the semantics of *only* as stated in the framework of alternative semantics?

As for the first question, it seems that we are forced to assume movement of the bound focus to its binder in one way or another, either by adjoining the focus to the binder itself (35a), or by adjoining it to the binder's sister node (35b) (see also von Stechow 1991).

- (35) a. [*only* [Bill]<sub>F</sub>] λ1 [John introduced *t*<sub>1</sub> to Mary].  
 b. *only* [ [Bill]<sub>F</sub> λ1 [John introduced *t*<sub>1</sub> to Mary] ].

This suggests that the structured meanings approach to the interpretation of focus is in fact a genuine movement approach (and, thus, fits nicely with, for instance, the cartographic approach). Keeping examples (25a) and (25b) in mind, this may of course cast some doubts on the viability of the structured meanings approach. On the other hand, we also saw in the last section that the island-insensitive nature of alternative semantics is in fact challenged in more complex examples (for detailed discussion, see Rooth 1996). And what is more, building on work done by Steedman (1991) and Drubig (1994), Krifka (1996) designs a semantic argument that suggests that association with focus, or to be more precise: association with focus phrase FP, does respect islands constraints after all. To see this, consider example (36).

- (36) Sam only talked to [the woman who introduced [Bill]<sub>F</sub> to John]<sub>FP</sub>

Suppose that *only* associates with *Bill*, and suppose furthermore the following context: Sam only talked to one person, namely Mary, and Mary introduced two persons to John, namely Bill and, say, Tim. Intuition tells us that, in this context, (36) is to be judged as true. However, given the semantics of *only* in (34c), (36) comes out as false, since, by assumption, both *Sam talked to the woman who introduced Tim to John* and *Sam talked to the woman who introduced Bill to John*

are true, but Bill is not identical to Tim. Does the semantics of *only* in (23c) fare better? Not really. The problem is that within alternative semantics – and this concerns all variants of alternative semantics, including the binding approach put forward in Wold (1996) (even though this variant is capable of interpreting nested foci) – we need to compare intensions rather than extensions, but the definite description *the woman who introduced Bill to John* is certainly different from the definite description *the woman who introduced Tim to John*, and, as a consequence, the resulting propositions are, too. According to Krifka (1996) this suggests that *only* does not in fact directly associate with the focus *Bill*, but rather with the so-called focus phrase (FP) *the woman who introduced Bill to John*, which he takes to covertly move to its binder *only*. And what about the focus *Bill* internal to FP? (37) in turn suggests that focus interpretation within FP does not involve focus movement and that the derivation of alternatives to the focus phrase FP can proceed along the lines of alternative semantics.

(37) Sam only talked to [the man who mentioned [the woman who introduced [Bill]<sub>F</sub> to Sue] ]<sub>FP</sub>

As we just saw, Krifka's (1996) proposal relies on the assumption that there are two kinds of focus-related constituents, focus and focus phrase, which behave completely different at the level of logical form, one being subject to covert movement, the other being interpreted in situ. Alternatively, one could think of examples like (36) as nested focus structures which are subject to a syntactically and semantically uniform treatment of the two foci in question; see (38). But what could such a uniform treatment of nested focus structures look like?

(38) Sam only talked to [the woman who introduced [Bill]<sub>F</sub> to John]<sub>F</sub>

Suppose both foci move covertly. In this case, movement of the internal focus *Bill* needs to target the DP *the woman who introduced Bill to John*, which is in violation of the complex noun phrase constraint. This suggests that focus, embedded or not, needs to be interpreted in situ. On the other hand, Krifka's argument shows that *only* needs access to the extension of the embedding focus, that is, some kind of structured meaning approach is called for.

The challenge then is to derive the structured meanings in question without moving the focused constituents. – As is argued in Reich (2004), one solution to this challenge may be choice

functions. To see this, consider first the somewhat simpler example in (39a).

- (39) a. John  $\text{only}_{F1}$  introduced  $[\text{Bill}]_{F1}$  to Mary.  
 b.  $\text{only}(\langle \text{Bill}, \lambda x. \text{John introduced } x \text{ to Mary} \rangle)$   
 c.  $\text{only}(\langle f_{\text{Bill}}, \lambda f_1. \text{John introduced } f_1(\text{alt}_c(\text{Bill})) \text{ to Mary} \rangle)$

Suppose, following Kratzer and Wold, that F-markers come as F-indices that are bound by some coindexed focus-sensitive operator; see (39a). Within the structured meanings approach, binding a focus F1 is usually taken to trigger focus movement and to structure the proposition; see (39b). Alternatively, we could think of the F-index as locally introducing alternatives to *Bill*. To this effect, we make use of the context-sensitive alternative function  $\lambda x. \text{alt}_c(x)$ , which maps Bill to the set of its contextually salient alternatives (including Bill himself). Since  $\text{alt}_c(\text{Bill})$  is a set, there is a (minimal) choice function  $f_{\text{Bill}}$  which chooses exactly Bill from this set. The resulting proposition *John introduced  $f_{\text{Bill}}(\text{alt}_c(\text{Bill}))$  to Mary* is apparently equivalent to the proposition *John introduced Bill to Mary* (for  $f_{\text{Bill}}(\text{alt}_c(\text{Bill})) = \text{Bill}$ ), but it allows access to the salient alternatives to *Bill* if we substitute a variable  $f_1$  over choice functions for the function  $f_{\text{Bill}}$ . Since *only* is coindexed with the focus in question, this choice function variable  $f_1$  can be bound by *only*, and the choice function  $f_{\text{Bill}}$  can be locally reconstructed as a definite description without covertly moving the focus to its binder. Quite like in Wold's approach, the latter process requires some means of ignoring the bound focus F1 (see Reich, 2004, for details).

The choice function approach to association with focus combines aspects of alternative semantics (focus introducing alternatives and being interpreted in situ) with the general architecture of structured meanings. Within this approach, examples like (38) above now can in fact be analyzed in a uniform way as nested focus structures; see (40).

- (40) Sam  $\text{only}_{F1}$  talked to [ F2 [the woman who introduced  $[\text{Bill}]_{F2}$  to John] ] $_{F1}$

The basic idea is that *only* (or, more precisely, its binder index F1) binds the F-index F1 that marks the definite description *the woman who introduced Bill to John* as focus. This index (or, more precisely, its corresponding binder index F2) in turn binds the F-index F2 on *Bill*. Local binding of F2 results, as desired, in an alternative set containing structured definite descriptions of the form  $\langle f_{\text{Tim}}, \lambda f_2. \text{the woman who introduced } f_2(\text{alt}_c(\text{Bill})) \text{ to John} \rangle$ .

As regards the interpretation of *only*, we may now require *only* to compare extensions of unstructured alternatives, which solves the problem raised by Krifka without stipulating the existence of a focus phrase FP (see also von Stechow, 1997, for a proposal within alternative semantics). This comes at a price, however. As is evident from the discussion above, the proposals become more and more complex, and one may wonder whether there is some simpler alternative which is nevertheless firmly grounded on intuitions about focus.

### 2.3. Givenness

As we saw in section 1, the literature actually refers to two different intuitions when it comes to focus: One intuition is that focus triggers alternatives; this is the starting point of alternative semantics. The other intuition is that focus marks information as new, or, more precisely, as not being given; this is the starting point of Schwarzschild's (1999) givenness approach (see Halliday 1967; Chafe 1976; von Stechow 1981, amongst others).

Consider (41) by way of illustration. If (41a) is intended as an answer to the question *What did John's mother do?*, the object *Bill* is stressed. However, if the same question is answered with (41b), stress shifts to the verb *praise*. But why is that? The straightforward answer to this question is: because the referent of *him*, John, was already mentioned in the preceding question. Thus, in a sense, *him* is given in (40b) relative to the relevant context.

- (41) What did John's mother do?
- a. She praised *BILL*.
  - b. She *PRAISED* him.

The case is similar in (42). In (42a) the head noun *convertible* receives stress, while the attributive adjective *red* is less prominent. In (42b), however, stress shifts to the adjective *blue*, and the head noun is less prominent. Again, it is straightforward to trace this effect back to the head noun *convertible* being given in (42b) in the context of (42a). Considered from this perspective, the contrastive interpretation of the adjective *blue* in (42b) is actually more of a side effect of deaccenting *convertible* than the actual reason why the adjective is stressed.

- (42) a. John drove Mary's red *conVERTible*.

- b. No, John drove Mary's *BLUE* convertible.

But can we determine whether the utterance of some phrase is given relative to some known context  $c$ ? In the case of expressions of type  $e$  givenness boils down to coreference. But in what sense is, for example, the noun *convertible* given in an utterance of (42b)? According to Schwarzschild (1999), givenness is an entailment relation between two utterances A and U, and U is given relative to A, roughly speaking, if the denotation of A entails the denotation of U, provided we ignore the semantic contribution of the focused constituents. Reconsider (42), and suppose that in (42b) only the adjective *blue* is F-marked. Ignoring the semantic contribution of the adjective *blue* boils down to substituting the focus with a variable  $Q$  of relevant type and to existentially binding the variable. Now, since *John drove Mary's red convertible* entails that  $\exists Q(\text{John drove Mary's } Q \text{ convertible})$ , an utterance of (42b) with the indicated focus structure is given relative to an utterance of (42a). But this is apparently also true of an utterance of (42b) in which not only *blue*, but also *Mary's blue convertible* is F-marked. Thus, if we want to exclude the latter as a possible focus structure, we need in addition some constraint that tells us to use as few F-markers as possible. This is Schwarzschild's constraint AvoidF.

The nice thing about Schwarzschild's definition of givenness is that it easily generalizes to non-sentential expressions. Suppose we want to know whether the VP *drove Mary's [blue]<sub>F</sub> convertible* is given. The first thing to do is shift this expression to type  $t$  by existentially quantifying over possible subjects, which results in something like  $\exists x(x \text{ drove Mary's } [blue]_F \text{ convertible})$ . The second thing to do is to existentially close the focus *blue* within VP, which finally results in something like  $\exists Q \exists x(x \text{ drove Mary's } Q \text{ convertible})$ . Apparently, the latter is entailed by (42a), and so is, by assumption, the VP.

In this vein, we can also establish the givenness of the noun phrase *Mary's [blue]<sub>F</sub> convertible* in (43c). But this comes somewhat as a surprise, since it is frequently assumed that in an answer to a *wh*-question the constituent that corresponds to the *wh*-phrase is F-marked (too), which correctly derives the elliptical or fragment answer *Mary's blue convertible* in (43c). This suggests that the role of rhetorical relations needs to be taken into consideration here (see Reich, 2002, for a detailed proposal within Schwarzschild's approach).

- (43) a. John drove Mary's red *convertible*.

- b. What did he drive before that?
- c. (He drove) Mary's [*blue*]<sub>F</sub> convertible.

The crucial characteristic of Schwarzschild's proposal then is that focus is in fact not interpreted at all at the level of semantics. Rather the set of focused constituents is restricted in a process of elimination by checking givenness relations and requiring given constituents to not be F-marked. F-markers in this approach are simply used to predict the placement of accent, to which effect Schwarzschild stipulates two more constraints (1. F-marked constituents that are not immediately dominated by another F-marked constituent contain an accent; 2. A head is less prominent than its internal argument), which are, however, not of immediate concern to us here.

Since F-markers do not play any role in interpretation, the question comes up again as to whether they are in fact needed. The (now) obvious alternative is to stipulate the existence of givenness markers G that check for every G-marked constituent whether it is given in the relevant context, or not. If it is, G-marking of the constituent is licensed, otherwise not. This is actually what is proposed in Sauerland (2004) and elaborated on in Wagner (2007).

In the context of the question *Who drove what?*, an answer like *John drove Mary's red convertible* is then represented as (44a) rather than (44b). (Note that in this approach stress is naturally restricted to non-G-marked phrases; see Sauerland 2004, and Wagner 2007.)

- (44) a. John [drove]<sub>G</sub> Mary's red convertible
- b. [John]<sub>F</sub> drove [Mary's red convertible]<sub>F</sub>

None of the examples considered so far contained any focus particles like *only*, and this is for a good reason. Since focus is, by assumption, irrelevant to interpretation, the notion of association with focus in the sense(s) introduced above cannot play any role at all in the givenness approach (as long as we stick to the assumption that givenness is in fact sufficient to account for all relevant focus phenomena). Within this approach, any explanation of the seemingly focus-sensitive semantics of *only* needs to be stated without recourse to the notion focus at all. What is needed is a more indirect way, a (very) weak theory of the semantics and pragmatics of *only*.

- (45) John only(C) introduced *Bill* to Mary



Apparently, the key to an adequate treatment of *only* in the givenness approach is its restrictor  $C$ . If there is some straightforward way to require  $C$  to contain all relevant propositions of the form *John introduced  $x$  to Mary*,  $x$  being some salient individual, without resorting to any kind of focus interpretation, then we are in a position to stick to a semantics of *only* as proposed within alternative semantics. According to Schwarzschild (1997) this may in fact be viable if pragmatic felicity conditions related to the (typical) use of *only* are taken into account (which includes, as is argued by Schwarzschild 1997, its use as a denial).

It should be noted here that we do in fact already know a weak theory of the semantics and pragmatics of focus, namely Rooth's (1992) anaphoric version of alternative semantics. To be sure, Rooth's approach *does* of course refer to the notion of alternative sets, and thus to focus; the way in which it does, however, is rather indirect (though not as indirect as required by the givenness approach): The domain  $C$  of the quantifier *only* is restricted by way of anaphora, that is, by coindexing it with the anaphor  $\Gamma$  which relates to the squiggle operator  $\sim$ . As we saw above, the squiggle operator adds the presupposition that its sister's focus value is a superset of the interpretation of  $\Gamma$ , thus indirectly restricting *only*'s restrictor  $C$  to a subset of the focus value of  $\alpha$ .

#### **2.4. Presupposition**

In a way then, the domain  $C$  of *only* is restricted by relating the relevant focus structure (the syntactic and semantic scope of  $\sim$ ) to a somewhat complicated presupposition. But if focus interpretation requires the statement of a presuppositional constraint anyway, why don't we adopt a simpler and perhaps more intuitive requirement already proposed by Chomsky (1977) and others. Consider, for example, an utterance of (46a) with the indicated focus structure. Suppose we first substitute each focus  $F$  with a variable  $x$ , and derive on this basis the presupposition skeleton of (46a) in the sense of Jackendoff (1972); see (46b). In a second step, we existentially close the variables, resulting in the case of (46a) in the proposition *that John introduced someone to Mary*; see (46c). It is this proposition that is, intuitively, made salient by an utterance of (46a). So why not assume that this proposition is in fact presupposed by an utterance of (46a)? This position (or, to be more precise, a somewhat weaker version of this position) has in fact been recently defended in Geurts and van der Sandt (2004a, b).

- (46) a. John introduced [Bill]<sub>F</sub> to Mary  
b. *John introduced x to Mary*  
c.  $\exists x(\text{John introduced } x \text{ to Mary})$

At first glance, it is in fact not at all clear whether the presuppositional approach is really that different from alternative semantics and the givenness approach. In the givenness approach, (46a) is given, if there is an utterance A in the previous context that entails the proposition in (46c). Thus, the information expressed by (46c) is required to be part of any adequate context of utterance, and in this sense (46c) is presupposed by (46a). In alternative semantics, the relevant alternative set consists only of propositions of the form *John introduced x to Bill*, the disjunction of which entails the proposition in (46c).

Still, there are important differences that distinguish the presuppositional approach from the other two approaches. Consider, for example, (47), taken from Kratzer (2004).

- (47) a. Did anybody eat the beans?  
b. Yes, [Fred]<sub>F</sub> did (eat the beans).

According to the givenness approach the verb phrase *eat the beans* is given in (47b) since there is an antecedent (*eat the beans*) in (47a), and the existential closure of the antecedent apparently entails the existential closure of the VP in question. But (47a) does not presuppose that someone ate the beans nor does its denotation entail the proposition that someone did.

As is argued in Geurts and van der Sandt (2004a) presuppositions and focus show similar projection behavior, which indicates that there might in fact be some common mechanism at work here. On the other hand, the contrast in (48), due to Chris Potts, shows that the presupposition triggered by *too* in (48a) cannot be satisfied by the proposition embedded under *doubt*, but the supposed presupposition in (48b) can.

- (48) a. #Sue doubts that Ed attended the meeting,  
but/and we all agree that Jill attended the meeting too.  
b. Sue doubts that Ed attended the meeting,  
but we all agree that [Jill]<sub>F</sub> attended the meeting/did.

Another characteristic property of presuppositions is that their failure typically results in a truth-value gap. However, as Kratzer (2004) argues, if we answer the question in (49a) with (49b), then its utterance is, in this context, inappropriate, but it does not lack a truth value.

- (49) a. What did Fred eat?  
b. [Fred]<sub>F</sub> ate the beans.

These are three of many arguments that suggest that, in the end, focus cannot be reduced to presuppositions. For a more thorough discussion, see, for example, Rooth (1999), the comments on the target article by Geurts and van der Sandt (2004a) in the same volume of *Theoretical Linguistics*, and more recently Abusch (2007).

## 2.5 Weak and strong approaches to focus

This leaves us, in essence, with two kinds of approaches to the semantics and pragmatics of focus. There are, as we saw above, on the one hand, strong approaches that start from the assumption that focus and focus-sensitive expressions are directly related by some mechanism of focus binding; see e.g. the proposals in Jacobs (1984), von Stechow (1981), Krifka (1991), Wold (1996) and Reich (2004). On the other hand, there are weak(er) approaches that are built on a more indirect way of relating focus and focus-sensitive expressions, like e.g. Rooth (1992), von Stechow (1994) and, in particular, Schwarzschild (1999).

However, as recent work by Beaver and Clark (2003, 2008) suggests, we may not have to choose between the two approaches. Consider (50) and (51).

- (50) a. A: Does Sandy feed Nutrapup to her dogs?  
b. B: Yes, Sandy always feeds Nutrapup to [Fido]<sub>F</sub>,  
c. and she always feeds Nutrapup to [Butch]<sub>F</sub>, too.

- (51) a. A: Does Sandy feed Nutrapup to her dogs?  
b. B: Yes, Sandy only feeds Nutrapup to [Fido]<sub>F</sub>,  
c. #and she only feeds Nutrapup to [Butch]<sub>F</sub>, too.

Beaver and Clark observe that an utterance of (51c) in the context of (51a) and (51b) is

infelicitous. This contrasts with (50c), which differs from (51c) only in that the second occurrence focus is, loosely speaking, bound by *always* rather than *only*. This suggests that *only* systematically triggers an exhaustive interpretation while *always* does not. The fact that *only* triggers an exhaustive interpretation is nicely captured in strong approaches. But what about *always*? As long as we take the alternative set to only contain propositions of the form *Sandy feeds Nutrapup to x*, where *x* is some (salient) dog, both weak and strong theories likewise predict an exhaustive interpretation for *always*. How, then, can we account for the fact that *always* does not explicitly exclude situations in which Sandy feeds Fido together with, say, Butch? Suppose *always* does not quantify over alternatives to Fido but over contextually relevant situations *s*. Suppose furthermore that the focus structure in (50b) restricts this set to the set of situations *s* where Sandy feeds Nutrapup to some number of dogs. Given this, we can take *always* to require of all these contextually relevant situations *s* that they contain some situation *s'* in which Sandy feeds Nutrapup to Fido. Apparently, this is consistent with *s* itself being a complex situation in which Nutrapup is fed to both Fido and Butch.

The difference between *only* and *always* is then accounted for by appealing to a weak theory of focus in the case of *always* and a strong theory in the case of *only*. Building on work done by Bonomi and Casalegno (1993) and Herburger (2000), Beaver & Clark (2003, 2008) propose a uniform analysis in terms of quantification over events, one that attributes the observed contrast to context-sensitive properties of *always* that *only* seems to lack.

### 3. Topic and comment in semantics and pragmatics

#### 3.1. Discourse topic

In the previous section, we argued that sentences like (52b) fall into two parts, the focal part on the one hand, and the background part on the other. Sometimes, the non-focal part is also called the topic (see e.g. von Stechow 1981).

- (52) a. What did you sell to Clyde?  
b. I sold [my typewriter]<sub>F</sub> to Clyde.

This topic concept relates to what is usually called a *discourse topic* in the current literature. The basic idea is that, in general, discourse is structured by explicitly or implicitly given questions,

frequently called questions under discussion, in short QUDs (see, amongst others, von Stechow 1981; Klein and von Stechow 1987; Steedman 1990; van Kuppevelt 1991; Roberts 1996; Büring 2003; Aloni et al. 2007). In (52), for example, it is the question (52a) that structures the discourse sequence consisting of (52a) and (52b). In this sense, the question in (52a) is the topic of the discourse in (52). This discourse topic, however, is reflected in the focus structure of (52b). This is evident in the structured propositions approach to focus: The question in (52a) denotes the property  $\lambda x.I \text{ sold } x \text{ to Clyde}$ , which is identical to the non-focal part of the structured proposition  $\langle \text{my typewriter}, \lambda x.I \text{ sold } x \text{ to Clyde} \rangle$  that interprets the focus structure in (52b). In this sense, the non-focal part of (52b) is, or better reflects, the topic an utterance of (52b) relates to.

### 3.2. Contrastive topic

Suppose that the idea of *wh*-questions structuring discourse is on the right track, that is that each utterance in a text or discourse needs to address some implicitly or explicitly given QUD. But then, what about questions themselves? What do they relate to? Consider (53).

- (53) a. What did [you]<sub>F</sub> sell to Clyde?  
 b. [I]<sub>CT</sub> sold [my typewriter]<sub>F</sub> to Clyde.

Like any other utterance, questions are also part of a more complex discourse, and thus typically relate to previous context. In particular, questions also carry focus structures; see for example (53b). Now, as we saw in (52) above, the topic an utterance relates to appears to be reflected in the focus structure of the utterance itself. With respect to (52b), we argued that the non-focal part of the answer corresponds to the topic it relates to. Since the question (53a) denotes modulo focus the property  $\lambda x.I \text{ sold } x \text{ to Clyde}$ , its focus structure denotes the structured question  $\langle \text{you}, \lambda y \lambda x.y \text{ sold } x \text{ to Clyde} \rangle$ . The non-focal part of this structured question, however, corresponds to the (unstructured) interpretation of the question *Who sold what to Clyde?*. Thus, by the same line of reasoning, we are able to establish that the question in (53a) actually addresses the more general question of *Who sold what to Clyde?*. The topic a given question relates to in discourse thus is simply a more general question.

What is of further interest here is the fact that the focus structure of the question in (53a) not only reflects the discourse topic it relates to, but that it also seems to have an interesting effect on the way the answer (53b) to (53a) is pronounced. Even though (53a) can be answered with the

short answer *my typewriter*, the sentential answer in (53b) seems to require a pitch accent on the subject *I*. This accent differs from the pitch accent on *my typewriter* in that it is best described as a fall-rise contour. In short, this accent seems to be a B accent in the sense of Jackendoff (1972). Suppose we interpret B accents essentially parallel to A accents, as structuring meanings; then the answer in (53b) denotes the nested structured proposition in (54b).

- (54) a.  $[I]_{CT}$  sold  $[my\ typewriter]_F$  to Clyde.  
 b.  $\langle I, \lambda y. \langle my\ typewriter, \lambda x. y\ sold\ x\ to\ Clyde \rangle \rangle$

This is very much reminiscent of what Jackendoff claimed about the interpretation of A and B accents (Jackendoff, 1972, 262): “The B accent occurs on the variable whose value is chosen first, the one which [the] speaker [...] is asking about. The A accent occurs on the variable whose value is chosen second, so as to make the sentence true for the value of the other variable.” In other words, the interpretation of the B accent gives rise to a set of contrasting questions of the form *What did y sell to Clyde?*, *y* being some (salient) individual; see (55). All these contrasting questions address the same topic in discourse, the question *Who sold what to Clyde?*.

- (55) a. What did *Bill* sell to Clyde?,  
 b. What did *Sue* sell to Clyde?, etc.

From this point of view, B accents simply mark contrastive focus on a higher level, namely contrastive focus in *wh*-questions (see e.g. Romero 1998). On the other hand, it is, intuitively, the contrastive focus in the *wh*-question (53a) which determines who the “speaker [...] is asking about” in (53b). In this sense, the B accent also marks an aboutness topic. Thus, all in all, it seems justified to dub B accented constituents *contrastive topics*.

This is actually the term introduced by Büring (1997) to refer to B accented constituents, which he takes to be marked with the index CT; see (53b) above. Starting from the work done by Jackendoff (1972), Büring (1997) proposes an interpretation of contrastive topics along the lines sketched in the previous paragraphs within the framework of alternative semantics: While A accents give rise to propositional alternatives (sets of propositions), B accents give rise to alternative questions (sets of sets of propositions). By way of illustration, consider once more (53b). Interpreting the focus on *my typewriter* in (53b) results in a set of propositions as indicated

in (56), which (essentially) corresponds to the Hamblin denotation of the question *What did you sell to Clyde?*. If we now interpret the contrastive topic *I* using essentially the same techniques, though on a different level of interpretation, this results in a set of (contrasting) questions like (56) and (57), or – to put it somewhat differently – in a set of sets of (contrasting) propositions. This set of sets of propositions is denotationally equivalent to a set of questions like *What did y sell to Clyde?*, where *y* is any individual. And this higher order object is in turn equivalent to the denotation of the question *Who sold what to Clyde?* (Hagstrom 1998).

- (56) What did *you* sell to Clyde?  
 a. *that I sold my typewriter to Clyde,*  
 b. *that I sold my adding machine to Clyde, etc.*

- (57) What did *Sue* sell to Clyde?  
 a. *that Sue sold her typewriter to Clyde,*  
 b. *that Sue sold her adding machine to Clyde, etc.*

According to Büring (1997, 1999), B accents furthermore trigger an implicature, which we could dub an *incompleteness implicature*. It basically states that B accents suggest that there is still one locally relevant QUD that is not yet fully resolved; see (58), adapted from Büring (1999: 150).

- (58) Given a sentence *A*, containing a contrastive topic, there is an element *Q* in  $[[A]]_{CT}$ , such that *Q* is still under consideration after uttering *A*.

Related to this, observe that B accents may (for whatever reason) also give rise to scope inversion effects, as in the example *All (B) of my friends didn't (A) come* already discussed above.

### 3.3 Sentence topic

As we saw above, contrastive topics systematically carry B accents, and may be quantificational. These properties distinguish contrastive topics from other constituents like *Mr. Morgan* in (59) (taken from Reinhart 1981) which are also usually called topics in the literature.

- (59) Mr. Morgan is a careful researcher and a knowledgeable semiticist, but his

originality leaves something to be desired.

In what sense, then, is *Mr. Morgan* or rather its referent the topic of (59)? *Mr. Morgan* certainly does not constitute a topic in the sense of a discourse topic as introduced above. This would be rather a QUD like, for example, *What are Mr. Morgan's scholarly abilities?*.

As Reinhart (1981) and many others argue, there is intuitively a (somewhat) different concept of topicality at stake here, namely aboutness: (59) “is about Morgan, because it predicates something about Morgan” (Reinhart 1981: 54). Since predication is a relation that holds between two parts of a sentence (or rather their denotation), aboutness topics always correspond to (the denotation of) an expression in the sentence. Let us call these topics, following Dik (1978), *sentence topics*. As we mentioned above, sentence topics may also occur left dislocated or as part of the phrase *as for NP*, see (60a) and (60b), which respectively mark Felix and Rosa as sentence topic. Both are truth-conditionally equivalent to the sentence *Felix invited Rosa to dance with him*, that is topicality has no truth-conditional effects.

- (60) a. As for Felix, he invited Rosa to dance with him.  
b. As for Rosa, Felix invited her to dance with him.

Rather, as Strawson (1964) argues, topics are a means to organize knowledge and to assess the truth of a sentence. As Reinhart (1981: 60) puts it “to assess the truth of [(60a)] we are likely to search our knowledge of Felix and see if among the people he may have invited we find Rosa, while in the assessment of [(60b)] we are more likely to check if among the things that happened to Rosa, we can find an invitation from Felix.” Reinhart (1981: 65) furthermore argues that while “quantified NPs are often hard, and sometimes impossible, to interpret as topics,” specific indefinites may very well function as topics; see for example the specific indefinite *a child of my acquaintance* in (61) and the discussion in Endriss (2009).

- (61) When she was five years old, *a child of my acquaintance* announced a theory that she was inhabited by rabbits. (The New York Times)

This example furthermore shows that topics do not necessarily constitute old information. Thus, they may but need not be part of the background of a sentence.



As we mentioned above, Reinhart (1981: 80) takes it that topics “are one of the means available in the language to organize, or classify the information exchanged in communication – they are signals for how to construct the context set, or under which entries to classify the new proposition.” Reinhart compares this procedure to the organization of a library catalog. Suppose you are interested in information about Felix, then you will probably check the catalog entry for “Felix”. And if you are interested in information about Rosa, you will probably check the catalog entry for “Rosa”. In both cases you may end up with the propositional information that Felix invited Rosa to dance with him, but you did so in two different ways.

Formally, the information presented by (60a) and (60b) can be represented as ordered pairs relating the topic and the proposition expressed by the relevant utterance; see (62a) and (62b). (Note that these representations look very much like structured meanings, but it is important to see that they are different: Structured meanings like  $\langle \alpha, \beta \rangle$  can be destructed via functional application  $\beta(\alpha)$  while the structured representations in (62) can not.)

- (62) a.  $\langle \text{Felix}, \text{that Felix invited Rosa to dance with him} \rangle$   
 b.  $\langle \text{Rosa}, \text{that Felix invited Rosa to dance with him} \rangle$

Thus, to say that an utterance of a sentence  $S$  in a context  $c$  is about  $a$  is to say that the propositional information conveyed by the utterance is stored under the entry for  $a$  in the context  $c$ ; if such an entry is not yet available, as with specific indefinites, an entry for  $a$  is first created.

This notion of topicality is, in one way or another, at the heart of most approaches to information structure, including the f-structure approach in Erteschik-Shir (1997, 2007), the link/tail approach in Vallduví (1990, 1992) or the proposal put forward in Lambrecht (1994). It could be somewhat too restrictive though. To see this, consider (63).

- (63) Körperlich geht es Peter gut  
 physically goes it-EXPL Peter-DAT well  
 ‘Physically, Peter is well.’

Intuition tells us that *körperlich* (‘physically’) is a topic-like expression. This is corroborated by the fact that in languages with morphosyntactic topic markers like Korean, *körperlich* is marked as a topic (see Jacobs 2001: 655). However, (63) is of course not about *körperlich* in the sense of

Reinhart, rather it is what Chafe (1976) calls a frame-setter, i.e. an expression which restricts the truth of the proposition to a certain domain. Chafe (1976: 51) therefore concludes that “‘real’ topics (in topic prominent languages) are not so much ‘what the sentence is about’ as ‘the frame within which the sentence holds’.”

On the other hand, it is far from clear whether the latter characterization is in fact general enough to also include Felix as the topic of (60a). This is the starting point for Jacobs’ (2001) proposal according to which topicality is a prototypical concept characterized by four different properties: informational separation, predication, addressation, and frame-setting. Whether such a radical move is actually enforced by the facts is still a matter of debate.

## References

- Abusch, Dorit 2007 Presupposition triggering from alternatives. *Journal of Semantics* 27, 37-80.
- Aloni, Maria, David Beaver, Brady Clark and Robert van Rooij 2007 The dynamics of topic and focus. In: Maria Aloni, Alastair Butler and Paul Dekker (eds.), *Questions in dynamic semantics*. Amsterdam: Elsevier, 123-146.
- Anderson, Stephen R. 1972 How to get even. *Language* 48, 893-905.
- Bartels, Christine 1999 *The intonation of English statements and questions: A compositional interpretation*. London: Routledge.
- Beaver, David I. and Brady Z. Clark 2003 “Always” and “only”: Why not all focus sensitive operators are alike. *Natural Language Semantics* 11, 323-362.
- Beaver, David I. and Brady Z. Clark 2008 *Sense and sensitivity: How focus determines meaning*. Oxford: Blackwell.
- Beaver, David Ian, Brady Z. Clark, Edward S. Flemming, Florian T. Jaeger and Maria K. Wolters 2007 When semantics meets phonetics: Acoustical studies of second occurrence focus. *Language* 83, 245-276.
- Bolinger, Dwight 1965 *Forms of English: Accent, morpheme, order*. Cambridge, MA: Harvard University Press.
- Bonomi, Andrea and Paolo Casalegno 1993 Only: Association with focus in event semantics. *Natural Language Semantics* 2, 1-45.
- Bosch, Peter and Rob van der Sandt (eds.) 1999 *Focus*. Cambridge: Cambridge University Press.

- Büring, Daniel 1997 *The meaning of topic and focus. The 59th street bridge accent*. London: Routledge.
- Büring, Daniel 1999 Topic. In: Bosch and van der Sandt (1999), 142-165.
- Büring, Daniel 2003 On d-trees, beans, and b-accents. *Linguistics and Philosophy* 26, 511-545.
- Chafe, Wallace 1976 Givenness, contrastiveness, definiteness, subjects, topics and point of view. In: Charles N. Li (ed.), *Subject and topic*. New York: Academic Press, 25-55.
- Chomsky, Noam 1977 On wh-movement. In: Peter W. Culicover, Thomas Wasow, and Adrian Akmajian (eds.), *Formal Syntax. Proceedings of the 1976 MSSB Irvine Conference on the Formal Syntax of Natural Languages*. New York: Academy Press, 71-132.
- Cohen, Antonie and Johan 't Hart 1967 On the anatomy of intonation. *Lingua* 18, 177-192.
- Cresswell, Max J. and Arnim von Stechow 1982 De re belief generalized. *Linguistics and Philosophy* 5, 503-535.
- Dik, Simon C. 1978 *Functional grammar*. Amsterdam: North Holland.
- Dretske, Fred 1972 Contrastive statements. *Philosophical Review* 81, 411-437.
- Drubig, Hans Bernhard 1994 Island constraints and the syntactic nature of focus and association with focus. Tech. Rep. 51 Arbeitspapiere des Sonderforschungsbereichs 340 Stuttgart/Tübingen.
- Endriss, Cornelia 2009 Quantificational topics – A scopal treatment of exceptional wide scope phenomena (Studies in Linguistics and Philosophy 86). Berlin, New York: Springer.
- Erteschik-Shir, Nomi 1997 *The dynamics of focus structure*. Cambridge: Cambridge University Press.
- Erteschik-Shir, Nomi 2007 *Information structure: The syntax-discourse interface*. Oxford: Oxford University Press.
- Fanselow, Gisbert 2007 The restricted access of information structure to syntax – A minority report. In: Féry et al. (2007), 205-220.
- Féry, Caroline 1993 *The tonal structure of standard German*. Tübingen: Niemeyer.
- Féry, Caroline 2007 The fallacy of invariant phonological correlates of information structural notions. In: Féry et al. (2007), 161-184.
- Féry, Caroline, Gisbert Fanselow and Manfred Krifka (eds.) 2007 *The notions of information*

*structure*. Potsdam: Universitätsverlag Potsdam.

von Fintel, Kai 1994 Restrictions on quantifier domains. Ph. D. Dissertation, University of Massachusetts.

Frey, Werner 2000 Über die syntaktische Position der Satztopiks im Deutschen. *ZAS Papers in Linguistics* 20, 137-172.

Frey, Werner 2004 A medial topic position for German. *Linguistische Berichte* 198, 153-190.

Geurts, Bart and Rob van der Sandt 2004a Interpreting focus. *Theoretical Linguistics* 30, 1-44.

Geurts, Bart and Rob van der Sandt 2004b Interpreting focus again. *Theoretical Linguistics* 30, 149-161.

Hagstrom, Paul 1998 Decomposing questions. Ph. D. Dissertation, University of Massachusetts.

Halliday, Michael A. K. 1967 Notes on transitivity and theme in English (part I). *Journal of Linguistics* 3, 37-81.

Hamblin, Charles L. 1973 Questions in Montague English. *Foundations of Language* 10, 41-53.

Herburger, Elena 2000 What counts: Focus and quantification. Ph. D. Dissertation, University of Massachusetts.

von Heusinger, Klaus 1997 Focus in complex noun phrases. In: Paul Dekker, Martin Stokhof and Yde Venema (eds.), *Proceedings of the 11th Amsterdam colloquium*. ILLC / Department of Philosophy University of Amsterdam, 49-54.

Höhle, Tilman N. 1982 Explikationen für ›normale Betonung‹ und ›normale Wortstellung‹. In: Werner Abraham (ed.), *Satzglieder im Deutschen*. Tübingen: Narr, 73-153.

Jackendoff, Ray 1972 *Semantic interpretation in generative grammar*. Cambridge, Massachusetts: MIT Press.

Jacobs, Joachim 1984 Funktionale Satzperspektive und Illokutionssemantik. *Linguistische Berichte* 91, 25-58.

Jacobs, Joachim 1997 I-Topikalisierung. *Linguistische Berichte* 168, 91-133.

Jacobs, Joachim 2001 The dimensions of topic-comment. *Linguistics* 39, 641-681.

Kiss, Katalin 1987 *Configurationality in Hungarian*. Dordrecht: Reidel.

- Kiss, Katalin 2007 Topic and focus: Two structural positions associated with logical functions in the left periphery of the Hungarian sentence. In: Féry et al. (2007), 69-81.
- Klein, Wolfgang and Christiane von Steutterheim 1987 Quaestio und referentielle Bewegung in Erzählungen. *Linguistische Berichte* 109, 163-183.
- Kratzer, Angelika 1991 The representation of focus. In: von Stechow and Wunderlich (1991), 825-834.
- Kratzer, Angelika 2004 Interpreting focus: Presupposed or expressive meanings? Comments on Geurts and van der Sandt. *Theoretical Linguistics* 30, 123-136.
- Krifka, Manfred 1991 A compositional semantics for multiple focus constructions. In: S. Moore and A. Wyner (eds.), *Proceedings of SALT I. Ithaca, N.Y.*: Cornell University Press, 127-158.
- Krifka, Manfred 1996 Frameworks for the representation of focus. In: G.- J. Krujiff, Glynn Morrill and Dick Oehrle (eds.), *Formal grammar. Prague: Eighth European Summer School for Logic, Language, and Information*, 99-112.
- Krifka, Manfred 2001 For a structured account of questions and answers. In: *Audiatur Vox Sapientiae. A Festschrift for Arnim von Stechow (Studia Grammatica 52)*. Berlin: Akademie Verlag, 287-319.
- van Kuppevelt, Jan 1991 Topic en comment. Ph. D. Dissertation, University of Nijmegen.
- Lambrecht, Knud 1994 *Information structure and sentence form: Topic, focus, and the mental representation of discourse referents*. Cambridge: Cambridge University Press.
- Musan, Renate 2010 *Informationsstruktur*. Heidelberg: Universitätsverlag Winter.
- Partee, Barbara H. 1999 Focus, quantification, and semantics-pragmatics issues. In: Bosch and van der Sandt (1999), 213-231.
- Pierrehumbert, J. and J. Hirschberg 1990 The meaning of intonational contours in the interpretation of discourse. In: Philip Cohen, Jerry Morgan and Martha Pollock (eds.), *Intentions in communication*. Cambridge, Massachusetts: MIT Press, 271-312.
- Reich, Ingo 2002 Question/answer congruence and the semantics of wh-phrases. *Theoretical Linguistics* 28, 73-94.
- Reich, Ingo 2003 *Frage, Antwort und Fokus*. Berlin: Akademie Verlag.
- Reich, Ingo 2004 Association with focus and choice functions – A binding approach. *Research on Language and Computation* 2, 463-489.
- Reinhart, Tanya 1981 Pragmatics and linguistics: An analysis of sentence topics. *Philosophica*

27, 53-94.

Rizzi, Luigi 1997 The fine structure of the left periphery. In: L. Haegeman (ed.), *Elements of grammar: Handbook in generative syntax*. Dordrecht: Kluwer, 281-337.

Rizzi, Luigi 2004 On the cartography of syntactic structures. In: Luigi Rizzi (ed.), *The structure of CP and IP*. New York: Oxford University Press, 3-15.

Roberts, Craige 1996 Information structure in discourse: Towards an integrated formal theory of pragmatics. In: J. Hak Yoon and Andreas Kathol (eds.), *Ohio State University working papers in linguistics* 49, Ohio State University.

Romero, Maribel 1998 Focus and reconstruction effects in wh-phrases. Ph. D. Dissertation, University of Massachusetts at Amherst.

Rooth, Mats 1985 Association with focus. Ph. D. Dissertation, University of Massachusetts.

Rooth, Mats 1992 A theory of focus interpretation. *Natural Language Semantics* 1, 75-116.

Rooth, Mats 1996 Focus. In: Shalom Lappin (ed.), *The handbook of contemporary semantic theory*. Oxford: B. Blackwell, 271-298.

Rooth, Mats 1999 Association with focus or association with presupposition. In: Bosch and van der Sandt (1999), 232-244.

Sauerland, Uli 2004 Don't interpret focus! Why a presuppositional account of focus fails and how a presuppositional account of focus works. In: Emar Maier, Corien Bary and Janneke Huitink (eds.), *Proceedings of Sinn und Bedeutung* 9. Nijmegen: Nijmegen Centre for Semantics, 370-384.

Schwarzschild, Roger 1997 *Why some foci must associate*. Ms., Rutgers University.

Schwarzschild, Roger 1999 GIVENness, AVOID-F and other constraints on the placement of accent. *Natural Language Semantics* 7, 141-177.

Selkirk, Elisabeth O. 1996 Sentence Prosody: Intonation, Stress and Phrasing. In: John A. Goldsmith (ed.), *The Handbook of Phonological Theory*. London: Blackwell, 550-569.

von Stechow, Arnim 1981 Topic, focus and local relevance. In: W. Klein and W. Levelt (eds.), *Crossing the boundaries in linguistics*. Dordrecht: D. Reidel, 95-130.

von Stechow, Arnim 1982 Structured propositions. Tech. Rep. 59 Arbeitspapiere des Sonderforschungsbereichs 99 Konstanz.

von Stechow, Arnim 1991 Current issues in the theory of focus. In: von Stechow and Wunderlich (1991), 804-825.

von Stechow, Arnim and Dieter Wunderlich (eds.) 1991 *Semantik – Ein internationales Handbuch zeitgenössischer Forschung. Semantics – An international handbook of contemporary research*. Berlin: de Gruyter.

Steedman, Mark 1990 Gapping as constituent coordination. *Linguistics and Philosophy* 13, 207-263.

Steedman, Mark 1991 Surface structure, intonation, and focus. In: Ewan Klein and Frank Veltman (eds.), *Natural language and speech*. Dordrecht: Kluwer, 260-296.

Sternefeld, Wolfgang 2006 *Syntax. Eine morphologisch motivierte generative Beschreibung des Deutschen*. Band 2. Tübingen: Stauffenburg.

Strawson, Peter F. 1964 Identifying reference and truth values. *Theoria* 30, 96-118.

Szabolsci, Anna 1981 Compositionality in focus. *Folia Linguistica* 15, 141-161.

Vallduví, Enric 1990 The informational component. Ph. D. Dissertation, University of Pennsylvania.

Vallduví, Enric 1992 *The informational component*. New York: Garland.

Wagner, Michael 2007 Givenness and locality. In: Jonathan Howell and Masayuki Gibson (eds.), *Proceedings of SALT 16*. Ithaca: CLC Publications.

Wold, Dag 1996 Long distance selective binding: The case of focus. In: Teresa Galloway and Justin Spence (eds.), *Proceedings of SALT 6*. Ithaca, N.Y.: Cornell University, 311-328.