I discuss the relation between information structure and truth conditional semantics, concentrating on the question of whether there is any direct interaction between the various information structural dimensions and operators such as quantified DPs and quantificational adverbs. Concerning the focus-background dimension, we will see that in most cases truth conditional effects do not result from direct focus sensitivity of the involved
operators, but rather come about as indirect effects of the need to resolve a free variable that is present in the denotation of these operators on the basis of contextual information – with the notable exception of exclusives such as only. Concerning the topic-comment dimension, in cases where a quantificational DP functions as the aboutness topic of a sentence, the need to interpret the comment as a predicate that can be applied to the topic has truth conditional effects in the presence of either another quantificational DP, a quantificational adverb or generic tense. In cases where a quantificational DP is marked as a contrastive topic, on the other hand, truth conditional effects come about indirectly. Finally, concerning the given-new dimension, there is also no evidence for a direct influence on the truth conditions of sentences, but only for indirect effects.

1. Introduction

The term information structure is meant to capture the different dimensions at which linguistic messages can be structured in accordance with requirements imposed by the linguistic and extralinguistic context as well as the communicative intentions of the speaker. At the first level, (the meanings of) sentences can be decomposed into topic and comment, where the term topic according to the most widely held view (but see below) intuitively stands for the entity about which the rest of the sentence – the comment – is felt to convey information. At the second level, sentences can be decomposed into focus and background, where the term focus intuitively stands for that part of the sentence that conveys the information the speaker wishes to represent as most prominent and onto which s/he wants to draw the hearer’s attention. Finally, at the third level the distinction between given (i.e. already mentioned explicitly or implicitly) and new information applies. It is important to keep these levels apart, i.e. it is not necessarily the case that topics are given, while foci are
new, or that the topic coincides with the background, while the focus coincides with the comment, although simple examples like (1b) seem to suggest this:

(1) a. Tell me something about John.
   b. John married BERTHA.

In the case of (1b), the subject noun phrase *John* is given, and furthermore has been made the aboutness topic (see below) by the preceding utterance (1a). On the other hand, the verb phrase *married BERTHA* is not only new, but also focal, which is indicated by the main stress on the object noun phrase *Bertha* (see below). In addition to that, since *topic-comment* as well as *focus-background* are complementary notions, the background consists of the noun phrase *John*, while the comment consists of the verb phrase *married BERTHA*. We thus have a perfect coincidence of topic, given information and background, on the one hand, and focus, new information and comment, on the other. However, one only needs to change the context in which the sentence in (1b) is uttered as minimally as shown in (2a) to see that this coincidence does not hold necessarily:

(2) a. Tell me something about John. Who did he marry?
   b. John married BERTHA.

Now, while *John* is still both given and topical, the focus does not coincide with the comment anymore: the focus consists only of the object noun phrase *Bertha*, but the whole VP *married BERTHA* makes up the comment. Similarly, the topic neither coincides with the background nor with the given information anymore, since both consist not only of the subject noun phrase *John*, but also contain the verb *married*. Below, we will even see cases where topics introduce novel information, and where given items are focussed. Traditionally, truth conditional semantics is not concerned with differences of the kind exemplified by the contrast between (1) and (2): (1b)/(2b) denotes the same proposition, independently of whether it is uttered in a context like (1a) or (2a), and the same generally holds for sentences that (only) differ overtly with respect to which item has been marked as topical/focal/given.
etc. Therefore, information structure is usually seen as belonging to the realm of pragmatics, since it only seems to be concerned with the question of how something is said (cf. Chafe 1976, who coined the term information packaging to capture this fact), but not what is said. We will see, however, that there are many cases where information structure and truth conditional content cannot be separated so neatly, and where it actually makes a difference to truth conditions whether an item is topical/focal or not. As we will see below, however, this does not necessarily mean that there is a direct interaction between the semantic and the pragmatic component of the language faculty. Rather, the observed truth conditional effects may also be interpreted as resulting from the combination of the following facts: first, some operators are semantically underspecified in the sense of containing free variables that need to be resolved on the basis of contextual information. Second, the information structure of a sentence encodes certain properties of the context in which the sentence is uttered. It is thus only natural that information structural distinctions like the one between focus and background or the one between topic and comment are made use of to resolve the respective variables.

2. Focus and background

At an intuitive, pre-theoretical level, the focus of a sentence is that part which represents the information the speaker considers most important and to which s/he accordingly wants to draw the hearer’s attention. In languages such as English and German and many others, focus is indicated by stress: the part of the sentence that is focussed must contain the syllable onto which the main stress falls. The exact conditions governing the decision of which word in a complex constituent must contain the syllable carrying the main accent are often assumed to be taken care of by rules of focus projection (Selkirk 1984). Such rules account for the fact that in many cases one and the same accent pattern can either indicate narrow focus on the word containing the syllable that receives highest stress, or wide focus on some
larger constituent containing that word. The contrast between (1b) and (2b) above is a case in point, where main stress on the first syllable of the proper name Bertha may either indicate that it is just the object noun phrase that is focussed, or the whole VP. Note, however, that phonological focus marking is by no means universal: there are languages such as Hungarian where focus is marked by dedicated syntactic positions, and others (many African tone languages such as Buli, Guruntum and Bole are cases in point) where morphological means are chosen.

According to a very common and classical view, which goes back to Paul (1880) and was taken up by Halliday (1967), and which we already employed in our discussion of (2) above, the focus of a sentence is identified with that part of a sentence that replaces the wh-part of a constituent question. Accordingly, the request in (1a) ensured that in (1b) the whole VP was focussed, while the question in (2a) ensured that in (2b) only the object NP Bertha was focussed.

In truth conditional semantics it is commonly assumed, following Hamblin (1973), that a question denotes the set of its possible congruent answers, i.e. a question such as What about John? denotes the set {[[John married Bertha]], [[John went to the movies yesterday]], [[John won the Nobel prize in literature]], ... }, while a question such as Who did John marry? denotes the set {[[John married Bertha]], [[John married Paula]], [[John married Jane]], ...}. Rooth (1985, 1992) now developed a formal theory of focus interpretation that employs the same formal object in order to model the denotation of focussed constituents. Simplifying somewhat, Rooth assumes that the semantic effect of focus-marking is the introduction of a (contextually restricted) set of alternatives to the (denotation of the) respective constituent, where the alternative set always includes the original denotation of the focus-marked constituent. These alternatives are then composed with the rest of the clause in pointwise fashion, resulting in a set of propositions which only differ from each other with respect to the chosen alternative. This set is called the focus semantic value (in addition to the ordinary
semantic value) of the respective sentence. Accordingly, the focus semantic value (indicated by the superscript \( F \), while the subscript \( F \) indicated focus marking) of the focussed constituent in (1b) is the set in (3a), while the focus semantic value of the whole sentence is the set in (3b). (4a, b) gives the same two objects for (2b).

(3) a. \([\text{married Bertha}]^F = \{ \lambda x. \lambda s. \text{married}(x, \text{Bertha})(s), \lambda x. \lambda s. \text{went\_to\_the\_movies}(x)(s), \lambda x. \lambda s. \text{won}(x, \text{Nobel prize})(s), \ldots \} \)

b. \([\text{John } [F \text{ married Bertha}]]^F = \{ \lambda s. \text{married}(\text{John}, \text{Bertha})(s), \lambda s. \text{went\_to\_the\_movies}(\text{John})(s), \lambda s. \text{won}(\text{John}, \text{Nobel prize})(s), \ldots \} \)

(4) a. \([\text{Bertha}]^F = \{ \text{Bertha}, \text{Paula}, \text{Jane}, \ldots \} \)

b. \([\text{John married } [F \text{ Bertha}]]^F = \{ \lambda s. \text{married}(\text{John}, \text{Bertha})(s), \lambda s. \text{married}(\text{John}, \text{Paula})(s), \lambda s. \text{married}(\text{John}, \text{Jane})(s), \ldots \} \)

The set in (3b) is identical to the denotation of the question in (1a), while the set in (4b) is identical to the question denotation in (2a). The theory of Rooth (1985, 1992) can thus account for the observed correspondence between the wh-parts of questions and focus-marking in a natural and elegant way by requiring the focus semantic value of a sentence to be a superset of the respective question denotation. In cases such as (5a, b), where this requirement is not met, infelicity ensues:

(5) a. Who did John marry?

b. \#John MARRIED Bertha.

The problem with (5a, b) is that while the question in (5a) denotes the already familiar set \{[[\text{John married Bertha}], [[\text{John married Paula}]], [[\text{John married Jane}]], \ldots \}, the answer in (5b) denotes the set \{[[\text{John married Bertha}], [[\text{John kissed Bertha}]], [[\text{John talked to Bertha}]], \ldots \}.\}
which is clearly not a superset of the first set. Crucially for our purposes, however, while (5b) is pragmatically infelicitous as an answer to (5a), its truth conditions, which correspond to the ordinary semantic value of the sentence, do not differ from the truth conditions of the congruent answer *John married BERTHA*. In other words, the alternatives introduced by the focus do not play any role at the level of truth conditions. Note that it is not even clear what pragmatic function they have in such cases since the plausible function of highlighting the part of the respective answer that provides the requested information does not seem to require the introduction of alternatives in any obvious way (but see Krifka 2008, who speculates that question-answer congruence might help the hearer to accommodate the meaning of implicit questions). An alternative account, according to which focus does not introduce alternatives, but rather triggers the presupposition that there exists an entity of the same type as the focus-marked expression (Geurts & van der Sandt 2004), can explain the observed necessity of question-answer congruence in the following way: in the case of (2), for example, the presupposition triggered by the focus-marking in (2b) matches the presupposition of the question in (2a), namely that John married somebody. In the case of (5), in contrast, this is not the case: while the question presupposes that John married somebody, the answer presupposes that John stands in some relation to Bertha. The problem with cases such as (5) would thus be that the immediate context does not satisfy the presupposition triggered by focus-marking. In cases other than information focus, however, the pragmatic role of the alternatives introduced via focus-marking is more obvious, although they still do not influence the truth conditions: in both (6b) and (6c), the implicit introduction of the alternatives to the asserted proposition allows the speaker to express her conviction that among these alternatives the asserted proposition is the only one that is true. This leads to a *corrective* interpretation in the first case, and to a *confirmative* interpretation in the second case:

(6) a. John married Bertha.
b. (No,) John married [f Jane].

c. (Yes,) John married [f Bertha].

In section 5 we will discuss cases where the alternatives introduced via focus-marking play a role at the level of the truth-conditions. But let us first turn to the second important dimension, the one where sentences are decomposed into topic and comment.

3. Topic and comment

*Aboutness topics*

As already said in the introduction, according to the most popular view today, which goes back to ideas formulated in different terms by Gabelentz (1869) and Paul (1880), and was brought to the fore in modern linguistic thinking by Reinhart (1982), the topic of a sentence is the part about whose denotation the rest of the sentence – the comment – is intuitively felt to convey information. In the case of (1b) above, for example, the topic status of the entity referred to by the proper name *John* was made explicit by the preceding (1a). Often, however, this is not the case, and there is nevertheless a clear intuition as to which part of a given sentence is to be taken as the topic. As already noted by Hockett (1958), in the default case the topic coincides with the grammatical subject. This, however, does not have to be the case, as shown by the contrast between (7a) and (7b):

(7) a. Peter finished his new paper yesterday.

b. The telephone is ringing.

While (7a) is naturally understood as conveying information about Peter, (7b) is not felt to convey information about some salient telephone, even though the DP *the telephone* is the grammatical subject in (7b). Rather, (7b) is most naturally understood as describing a particular spatiotemporal region or situation. The intuition that in sentences such as (7b) neither the grammatical subject nor any other overt constituent is the topic can be accounted for in two ways: either these sentences are analyzed as topicless or antitopical (Jacobs 2001),
Furthermore, in many languages such as German, Japanese, Hungarian and Korean there exist explicit morphological and syntactic means to unambiguously mark a constituent as the topic of a sentence, and there is no requirement for the constituent marked as the topic to be the grammatical subject. The sentence in (8), which exemplifies *German Left Dislocation* (henceforth:GLD), is a case in point:

(8) (Den) Peter, den hab ich lange nicht gesehen.

'I haven’t seen Peter for a long time’.

GLD, whose first systematic description in modern terms is found in Altmann (1981), is characterized by the following configuration: a constituent that occupies the left-peripheral position of the respective sentence co-occurs with a resumptive pronoun in clause-initial position with which it agrees in case-, number-, and gender-features. According to Frey (2004), German left-dislocated phrases which are not understood contrastively (see below) are necessarily interpreted as topics. This is evidenced by the fact that (8) is fine as an answer to a question like *What about Peter?* or a command like *Tell me something about Peter*, while it is odd as an answer to a question like *Who haven’t you seen for a long time?*, at least if it is not read with an intonational break after the fronted noun phrase and a strong accent on the resumptive pronoun. We can thus conclude that in (8), it is the left-dislocated object noun phrase *Peter* that is the aboutness topic of the sentence, not the subject noun phrase *ich*. Because of the prevalence of examples with proper names, definite descriptions and pronouns in the literature on topics, many linguists subscribe to the view that topics are necessarily at least weakly familiar, i.e. the existence of the respective entity must at least be inferable from the context/general world knowledge (cf. Hockett 1958; Kuno 1972; Gundel 1988; Portner & Yabushita 1998). It has, however, been observed by Reinhart (1982; see
also Molnar 1993 and Frey 2000, 2004) that familiarity cannot be a defining property of topics since not only individual-denoting noun phrases can be sentence topics, but also indefinite DPs (while other quantificational DPs are excluded from topic positions; more on this below), as shown by (9).

(9) Einem Freund von Peter, dem hat a/one-DAT.SING.MASC friend of RP-NOM.SING.MASC has

Angela Merkel gestern die Hand gegeben.
yesterday the hand given.

‘Angela Merkel yesterday shook the hand of a friend of Peter’.

Note that in all examples discussed so far, topic-marking only serves the pragmatic function of structuring the information conveyed by the respective sentence in a certain way, while it does not have any influence on the truth conditions: the variants given in (10), where np special topic marking devices are employed and where (the entities denoted by) his new paper, I and Angela Merkel therefore are the default topics because of subjecthood, are true under exactly the same conditions as (7a), (8) and (9), respectively.

(10) a. His new paper was finished by Peter yesterday.
b. Ich habe (den) Peter lange nicht gesehen.
   ‘I haven’t seen Peter for a long time’.
c. Angela Merkel hat gestern einem Freund von Peter die Hand geschüttelt.
   ‘Angela Merkel yesterday shook the hand of a friend of Peter’.

In addition to that, there are cases such as (11) where (the denotation of) a constituent that can plausibly be analysed as the topic stands only in a loose, underspecified relation to the proposition denoted by the rest of the sentence, and which have accordingly been classified as involving hanging topics:

(11) Concerning Schoenberg, I like Moses und Aron.

In section 6, we will discuss examples where topichood clearly has an effect on the truth
conditions. But let us first go into a little more detail about the alleged pragmatic effect of topicality in examples like the ones discussed so far. According to Reinhart’s (1982) very influential account – whose basic understanding of topichood goes back to Strawson (1964) – the topic corresponds to the address where the proposition denoted by the respective sentence is stored. Accordingly, Reinhart adopts a view of the *common ground* (CG), i.e. of the mutually shared knowledge of speaker and hearer, that is slightly more articulated than Stalnaker’s (1974, 1979) in the following sense: According to Stalnaker, the CG just consists of a set of propositions whose intersection gives the set of worlds that are compatible with everything that both speaker and hearer(s) know. Reinhart (1982), in contrast, assumes that these propositions are stored under particular addresses which she conceives of as mental files, i.e. an assertion of (8) results in the proposition that the speaker has not seen Peter in a long time being added to the address where information concerning the individual Peter is stored. This basic idea has been developed in different directions by Vallduvi (1992), Lambrecht (1994), and Portner & Yabushita (1998), who propose a model-theoretic re-definition of the concept of a file where information is stored.

*Frame-setting topics*

The example in (12) is not easily captured by the notion of aboutness topicality introduced in the last section: it does not make much sense to conceive of the proposition that Maria is doing well as being added to a file where information about heath is stored. Rather, the fronted adverb *gesundheitlich* (‘healthwise’) specifies the way in which the predicate *gut gehen* (be fine) is to be understood.

(12) Gesundheitlich geht es Maria gut.

healthwise goes expl. well.

‘Healthwise, Maria is fine’.

Nevertheless, researchers such as Chafe (1976) and many others have argued that the fronted
constituents in examples of this type should be analyzed as topics, which is further 
confirmed by the observation that in languages such as Japanese where topics are marked 
morphologically, the corresponding constituents are marked as such. Jacobs (2001) therefore 
argues for a view according to which there is not one unified definition of topicality, but 
rather a cluster of distinct, but nevertheless related properties that together define the field of 
topic-comment structures: informational separation (of the topical constituent from the rest 
of the sentence), predication (i.e. the comment is interpreted as a predicate that applies to the 
topic), addressation (which corresponds to aboutness), and frame-setting. Crucially, a 
constituent does not have to satisfy all of these properties to count as a topic, but only a 
substantive subset thereof, and Jacobs accordingly analyses various topic-marking 
constructions in German as being specified for different combinations. Jacobs defines frame-
setting in informal terms as in (13) (Jacobs 2001: 656):

(13) In \((X \ Y)\), \(X\) is the *frame* for \(Y\) iff \(X\) specifies a domain of (possible) reality to 
which the proposition expressed by \(Y\) is restricted.

Jacobs claims that in contrast to aboutness topicality, frame-setting topicality always has a 
direct influence on the truth conditions, since “the comment does not hold regardless of the 
topic, but only within the domain specified by the topic” (Jacobs 2001: 656). Here, Jacobs in 
my view confuses two different aspects, however: it is surely correct that marking a 
constituent as the aboutness topic in many cases does not have an influence on the truth 
conditions, either because the proposition denoted by the sentence remains the same 
regardless of which constituent is marked as the aboutness topic (examples (7a) and (8-10)), 
or because the aboutness topic stands only in an underspecified relevance relation to the 
respective proposition (example (11)). Concentrating on the latter case, it may seem that 
there is a general difference in the influence on truth conditions between frame-setting 
topicality and aboutness topicality, because dropping the hanging topic would not alter the 
truth conditions of the proposition functioning as the comment in examples like (11), while it
would in examples like (12). This, however, only shows that the denotation of the topical adverb directly contributes to the meaning of the proposition – just as the meanings of the respective topical constituents in (7a) and (8-10) do. Its topic status as such does not alter the truth conditions, however. After all, the truth conditions of (14), where the adverb *gesundheitlich* (‘healthwise’) remains in clause-internal position, do not differ from the truth conditions of (12):

(14) Maria geht es gesundheitlich gut.

‘Healthwise, Maria is fine’.

There is, however, another aspect in which (12) and (14) differ, which we glossed over so far: in contrast to (14), (12) is intuitively contrasted with alternative propositions where *gesundheitlich* has been replaced with other framesetters like *finanziell* (‘financially’), while *gut* has been replaced with other evaluative adverbs like *schlecht* (‘bad’) (cf. Krifka 2008: 46). Furthermore, observe that examples such as (12) are most natural if they are read with a rising accent on *gesundheitlich* in combination with a falling accent (which signals focus-marking) on *gut*. As we will see in the following section, this combination is characteristic of *contrastive topics*. We therefore have another option to analyse examples such as (14):

- namely as not instantiating a special kind of topicality (namely frame-setting topicality), but as exemplifying ordinary contrastive topicality, with a frame-setting adverb as the contrastive topic. Consequently, frame-setting would be entirely independent of topicality.

*Contrastive topics*

As mentioned above, contrastive topics, which have been discussed extensively by Büring (1997a, 1999) and Jacobs (1997), are marked by a characteristic intonation pattern in German (cf. Jackendoff’s 1972 discussion of the “B-accent” in English): a rising accent on the fronted constituent, which functions as the contrastive topic, is combined with a falling accent on some sentence-internal constituent, which is thus marked as focal. A typical
example is given in (15):

(15) /SCHOENberg MAG\ ich (während ich Berg und Webern hasse).

'Schoenberg, I like (while I hate Berg and Webern)'.

(15) is automatically understood as being implicitly contrasted with sentences involving alternatives to Schoenberg, and since the other two composers of the second Viennese School, Alban Berg and Anton Webern, are natural choices, the continuation in brackets would be entirely natural. Now, the introduction of alternatives via intonational prominence is certainly reminiscent of focus marking, so one might ask why examples such as (15) are not simply analysed as involving two instances of focus-marking. There are mainly two reasons why this cannot be correct: first, in sentences like (16b), which clearly contain two focussed items (see section 2 above), both are marked by a falling accent:

(16) a. Peter hat gestern auf der Party Maria geküsst (habe ich gehört).

'Yesterday at the party, Peter kissed Maria (so I have heard)'.

b. Nein, PAUL hat ClauDINE geküsst.

'No, Paul kissed Claudine'.

Second, in contrast to double focus, contrastive topicality in an answer to a question clearly indicates non-completeness, as can be shown by the contrast between (17b) and (17c): (17b) can only be understood as a partial answer, and therefore requires an interpretation of (17a) as a pair-list question. (17c), on the other hand, is naturally understood as an exhaustive answer, and thus requires (17a) to be understood as a single-pair question.

(17) a. Who kissed whom?

b. /PAUL hat ClauDINE geküsst.

c. PAUL hat ClauDINE geküsst.
From this we can conclude that the alternatives introduced via contrastive topic-marking differ from the ones introduced by focus-marking insofar as they indicate non-completeness, i.e. contrastive topic-marking is only appropriate if there are other relevant propositions that are true in the respective context, and that differ from the one asserted in both the constituent marked as the contrastive topic and the one marked as the focus. Consequently, (17b) would not only be inappropriate if nobody kissed anyone else, but also if Paul kissed other people. According to the very influential theory of Büring (1997a, 1999), contrastive topic marking similarly to focus marking results in the introduction of a set of alternatives to the (denotation of the) respective constituent, the so-called topic semantic value. The crucial difference between focus and topic semantic value is that the respective alternatives are structured in a different way: the double focus in (17c) introduces a set like the one in (18a), while the combination of contrastive topic- and focus marking in (17b) introduces a set (of sets) like the one in (18b):

(18) a. [[[Paul kissed Claudine]], [[Peter kissed Maria]], [[Eva kissed Maria]], ... ]

b. { [[[Paul kissed Claudine]], [[Paul kissed Maria]], ...]}, {[[Peter kissed Marial],

[[Peter kissed Martina]], ...], {[[Eva kissed Claudine]], [[Eva kissed Maria]], ...}, ...

Thus, while (18a) simply lists all possible kisser-kissee combinations, (18b) is structured in a more complex way: for each possible kisser, the set of all possible kissees is listed. In other words, (18a) contains the set of all possible answers to (17a), i.e. the denotation of the question in (17a). (18b), in contrast, contains the set of all answers to a set of sub-questions of the form *Who did Paul kiss?*, *Who did Peter kiss?*, *Who did Maria kiss?*, i.e. the denotations of the respective sub-questions. Consequently, the above mentioned contrast between (17b) and (17c) can be interpreted as follows: (17b) is understood as picking out the unique true proposition from the set in (18a), while (17c) is only understood as picking out
the unique true proposition from the first sub-set in (18b), giving rise to the expectation that the same will be done for the other sub-sets. The feeling of incompleteness that contrastive topic- in contrast to focus-marking – triggers can thus be explained in pragmatic terms along the following lines (Büring 2003: 9): since contrastive-topic marking generates a set of sub-questions, and since one of these sub-questions is already answered by the ordinary semantic value of the respective sentence, the principle of Informativity (Atlas & Levinson 1981) ensures that the hearer can assume the answers to the other sub-questions to differ with respect to the focus-marked constituent. Otherwise, i.e. if in a case like (17b) above someone besides Paul (say Peter) had kissed Claudine as well, the speaker should have said *Paul and Peter kissed Claudine* instead of (17b).

The theory just sketched informally, according to which contrastive topic marking generates a set of sets of propositions (i.e. a set of questions), while focus marking simply generates a set propositions (i.e. a question), gives us a plausible and elegant account of the discourse-pragmatic effects of contrastive topicality, and in section 6 we will see that it can also account for some observed truth-conditional effects. However, it leaves open the question of what contrastive topicality has to do with other kinds of topicality, especially with aboutness topicality (recall from section 3.2 that there are reasons to doubt the existence of frame setting topicality as a distinct kind of topicality). Concerning the empirical basis of grouping aboutness topics and contrastive topics together, the following observations speak in favour of such a classification: first, languages like Japanese use the same device to mark contrastive-topics and aboutness topic – namely the particle *wa*, and also in German contrastive topicality is at least compatible with GLD (but see below for a qualification). Second, just like aboutness topics, contrastive topics tend to be fronted (in German, for example, this is almost obligatory, while English is more liberal in this respect and allows foci to precede contrastive topics (see Jackendoff 1972). Third, we have seen above that questions of the form *What about X?* serve to explicitly mark the constituent X as the
aboutness topic of the sentence answering the respective question. As shown in (19), sentences containing contrastive topics can be used as partial answers to such questions:

(19) a. Who did the girls talk to at the party yesterday?
    b. /MarIa hat mit PAUL\ geredet.

'Maria talked to Paul’.

Consequently, one could make the following assumption: the object created via contrastive topic marking – the topic semantic value – always consists of propositions each of which contains a partial aboutness topic, i.e. a part of the complex object denoted by the respective (complete) aboutness topic. The special accent pattern indicating contrastive topicality would then simply result from the respective partial aboutness topic being contrasted with the other partial aboutness topics, which requires focus marking (cf. Krifka 1998).

This proposal works well in many cases, since it is often plausible to assume that the required sub-questions can be accommodated easily (see Roberts 1996, van Kuppevelt 1995 and Büring 2003 for the view that the topic-focus-articulation of sentences is best captured in terms of (answers to) explicit and implicit questions under discussion). Nevertheless it faces some serious problems. First, recall from section 3.1 that in GLD, which can plausibly be assumed to mark aboutness topicality, only a limited set of DPs is acceptable in left-dislocated position: the only quantifiers that are acceptable are indefinites with unmodified determiners, as shown by the unacceptability of examples like (20a). In contrast to this, even downward entailing quantifiers like the one in (20b) are acceptable as contrastive topics (recall from above that while contrastive topicality is in principle compatible with GLD, contrastive topics do not need to be marked via GLD):

(20) a. Weniger als acht Jungen, die haben Fußball gespielt.
    less than eight boys have soccer played

b. Weniger als /ACHT Jungen haben FUßball\ gespielt (und weniger als /NEUN Jungen HANDball\).
‘Less than eight boys played soccer (and less than nine boys handball)’.

To make things worse, the sentence in (20b) is even acceptable as a (partial) answer to a question like the one in (21):

(21) How many boys played which game?

Now in this case, even if we assume sub-questions such as Which game did less than eight boys play? to be accommodated, these can not plausibly be considered as establishing the respective DP as aboutness topic, since a variant like What about less than eight boys? Which game did they play? is extremely odd. I therefore conclude that at least for the time being we have to acknowledge the existence of at (least two) distinct kinds of topicality – aboutness topicality and contrastive topicality.

4. Givenness

The third information structural dimension that I will discuss in the present paper is the distinction between given and new information. As already alluded to in section 1, the given-new distinction cannot be reduced to the focus-background distinction, since it is both possible that material which has been explicitly mentioned in the preceding discourse is focus-marked, and that focal material contains given sub-parts, as shown by (22) (see Schwarzschild 1999) and (23) (from Wagner 2006; see also Féry and Samek-Lodovici 2006):

(22) a. Who did John’s mother praise?
    b. She praised HIM/JOHN

(23) Mary sat at her desk. John walked in. What happened next?
    a. # She kissed JOHN.
    b. She KISSED John.

Now, as already discussed by Halliday (1967) and Chafe (1976), de-accentuation is a means that is very commonly employed by languages to indicate that (the denotation of) a
constituent has either been introduced explicitly or implicitly (in the sense of its existence being entailed by the common ground) into the discourse. Nevertheless, in (22b) the need to ensure question-answer congruence via focus-marking the constituent that replaces the wh-term in the question in (22a) overrides the need to indicate the givenness of the individual referred to by John or him via de-accentuation. Alternatively, the elaborate account of givenness developed by Schwarzschild (1999) can explain the accent pattern in (22b) along the following lines: first, constituents whose denotation is entailed by a salient antecedent in the preceding context count as given. Since entailment is only defined for propositions, Schwarzschild assumes a mechanism of existential closure, “which raises expressions to type t, by existentially binding unfilled arguments” (Schwarzschild 1999: 147), and which applies after F-marked parts have been removed. For our limited expository purposes, F-marking, which corresponds to an additional abstract level of marking that is meant to capture the above mentioned rules of focus projection, can be equated with focus-marking. Second, non-F-marked constituents are given (Givenness). Third, F-marking is to be minimized (AvoidF). Applying these principles to the case of (22), the accent pattern of (22b) is correctly predicted: She praised HIM is given, since the proposition that we get by removing HIM and applying existential closure, namely that there is someone that John’s mother praised, is entailed by the preceding question in (22a). She praised him, in contrast, is not given, since the context does not entail the proposition that John’s mother praised John. Him, accordingly, has to be F-marked, while F-marking anything else would violate AvoidF. In the case of (23), question-answer congruence ensures that the whole sentence is focal (and the same is true of Schwarzschild’s system: the question in (23a) neither entails that Mary kissed somebody, nor that Mary did something to John, nor that Mary did something etc.). Nevertheless, the need to indicate the givenness of the individual referred to by John is strong enough to override the accentuation pattern that would normally be employed in such a case, and according to which the complement of the verb would receive the main accent.
(as shown in (22b)). Note, however, that given constituents (even if they do not need to be
accented because of being focal for independent reasons, as in (22b)) are not always de-
accented, as shown by Wagner (2006) for examples like the following one (Wagner 2006:
3):

(24) Mary’s uncle, who produces high-end convertibles, is coming to her wedding. I
wonder what he brought as a present.

a. He brought [a CHEAP convertible].
b. # He brought [a RED convertible].
c. He brought [a red CONVERTIBLE].

In the above context, the bracketed DP is always focal, and the noun convertible is always
given. Nevertheless, it may only be de-accented in (24a), but not in (24b). Intuitively, the
relevant contrast between the two is that cheap can naturally be contrasted with high-end,
while red can’t. Based on these and similar observations, Wagner (2006) argues that in order
for a constituent x to be marked as given via de-accentuation, it has to be given relative to its
sister, i.e. the context has to make available an alternative y’ to its sister y such that [y’ x] is
given. Technically, this is accomplished by assuming that de-accentuation is regulated by an
operator presupposing relative givenness in the sense just sketched (cf Schwarzschild 1999
and Sauerland 2004 for earlier approaches that work with givenness operators).

Other means than de-accentuation to indicate givenness are deletion, pronominalization, the
choice between the indefinite (for new discourse referents) and the definite (for given
discourse referents) article (cf. Heim 1982) and word order. Concerning the latter aspect,
there is a strong tendency for given material to precede new material, which may be
overwritten if canonical word order is employed, but has to be strictly respected if non-
canonical word order is chosen (see [84], where this is shown in detail for English). The
optional (re-)ordering of argument DPs in the German middle field which is known as
scrambling is a case in point: while indefinite DPs may precede definite DPs as long as the
canonical argument order (subject before indirect object, indirect object before direct object) is respected (as shown in (24a)), and while definite objects may be scrambled across indefinite subjects (as shown in (24b)), indefinite objects (at least if they are not marked as contrastive topics) may not be scrambled across definite subjects (as shown by (24c); see Büring 2001):

(25) a. (weil) ein Student den Dekan geohrfeigt hat.
(because) a-nom student the-ACC dean slapped-in-the-face has
‘... (because) a student slapped the dean in the face’.

b. (weil) den Dekan ein Student geohrfeigt hat.
(because) the-ACC dean a-NOM student slapped-in-the-face has

We have seen that the distinction between given and new material is linguistically relevant in the sense that languages employ a rich array of means to indicate givenness. It is also clear that the conditions under which the respective marking strategies apply have to be stated in semantic terms, since it is always identity of denotation that is relevant, not identity of form. This, however, still leaves open the question of whether givenness affects truth-conditions, i.e. whether there are, for example, any logical operators which associate exclusively with given material, or whether the means employed to mark givenness may also be used to achieve truth conditional effects.

5. Truth conditional effects of focus marking

Ex situ focus in Hungarian and exhaustivity

One of the prime examples that is often cited to show that focus marking can have truth conditional effects is the case of Hungarian ex situ focus, which is claimed to give rise to
exhaustivity effects (Szabolcsi 1981) – in contrast to in situ focus, which behaves just like
(intonational) focus in English insofar as it implicates, but does not entail exhaustivity:

(25) Nem PÉTER aludt a padlón, hanem PÉTER ÉS PÁL.
not slept the floor.on but and
‘It isn’t Péter who slept on the floor; it’s Péter and Pál’.

As argued for by Szabolcsi, examples like the one in (25) would be contradictory if it was
not part of the truth conditions, but merely an implicature that the (denotation of the)
focussed constituent was the only one among the salient alternatives that had the property in
question. From the observation that they are perfectly coherent she thus concludes that the

555 position to the immediate left of the tensed verb is a special focus position in Hungarian that
is directly associated with exhaustivity. More concretely, she assumes that the focussed
constituent occupies the specifier position of an exhaustivity operator whose meaning is
given in (26):

(26) \[ \lambda x[\lambda P[P(x) \& \forall y[P(y) \rightarrow y = x]]] \]

Applying the object in (26) to the focus-marked constituent to its left and to the rest of the
first sentence in (25) in turn gives us (27), whose negation is indeed coherent with the
continuation in (25). (Note that we have to assume that Péter and Pál denotes a sum
individual in the sense of Link 1983).

(27) slept_on_floor(peter) \& \forall y[slept_on_floor(y) \rightarrow y = peter]

560 There are, however, other facts which cast doubt on the assumption that the focus position in
Hungarian is directly associated with exhaustivity. Consider the two sentences in (28), which
were adapted by Wedgwood (2007) from an English example that Larry Horn (1981) used to
show that it-clefs do not encode exhaustivity (‘VM’ means verbal modifier).

(28) a. # Azt tudtam, hogy Mari megevett egy pizzát, de
that knew.1SG that VM.ate.3SG a pizza but
most vettem észre, hogy egy PIZZÁT evett meg.
now take mind.to(VM) that a pizza.ACC ate VM

# ‘I knew that Mari ate a pizza, but now I know that it was a pizza that she ate’.

b. Azt tudtam, hogy Mari megevett egy pizzát, de most

vettem észre, hogy csak egy pizzát evett meg.

take mind.to(VM) that a pizza.ACC ate VM

‘I knew that Mari ate pizza, but now I know that it was only pizza that she ate’.

In contrast to (28b), which contains the Hungarian equivalent of only, (28a) is infelicitous, which it should not be if a pizza in the second conjunct occupied the specifier position of the exhaustivity operator discussed above, i.e. if an exhaustive interpretation of a pizza was actually part of the asserted content. Now, Kenesei (1986) has argued for a modification of Szabolcsi’s (1981) analysis according to which the operator into whose specifier the focus marked constituent is moved denotes the object in (29):

(29) \[ \lambda x[\lambda P[x = \iota y [P(y)]]] \]

The crucial difference between (26) and (29) is that while in (26) uniqueness of the (denotation of the) focus marked constituent is part of the truth conditional content, it is merely presupposed in (29), since the application of the iota operator only yields a defined result if there is exactly one object that has the property denoted by the non-focal part of the clause. (28a) would thus be infelicitous for the same reason that (30) is: since the object that Mari ate has already been introduced under the description pizza, it is completely redundant to identify it with an object that is characterized by satisfying the same predicate.

(30) # I knew that Mary ate pizza, but now I know that the thing Mari ate a was pizza.

Modifying the operator analysis in the way suggested by Kenesei (1986) thus captures the empirical facts quite well. Wedgwood (2007) nevertheless claims that the position occupied by the focus marked constituents in (25) and (27) cannot be a designated focus position,
since in sentences with broad focus (i.e. in cases where the whole sentence is in focus) it is occupied either by the verbal modifier (if the main verb is marked for tense) or by the main verb. From this he concludes that the identificational interpretation sketched above comes about by inferential processes on the basis of an underspecified, incremental semantics. In a nutshell, he assumes that the position under discussion is reserved for the ‘main predicate’ of the respective clause, which in the default case is some verbal element. If it is a non-verbal element, however, this is only compatible with a situation where the (information provided by the) rest of the clause is presupposed, which leads to an identificational interpretation. The data discussed in this section thus at least do not have to be interpreted as showing that ex situ focus in Hungarian is directly associated with an exhaustive interpretation.

Focus sensitive operators

As already mentioned in section 2, in English, too, there are cases where focus marking has an effect on the truth conditions of sentences:

(31) a. Peter only goes to the BEACH with Mary.
    b. Peter only goes to the beach with MARY.

(32) a. Peter always goes to the BEACH with Mary.
    b. Peter always goes to the beach with MARY.

(31a) and (32a), are both false in a situation where Peter on nine of ten occasions where he goes somewhere with Mary goes to the beach with her, but takes her to the park on every tenth occasion. (31b) and (32b), in contrast, are true in such a scenario, as long as Peter never goes to the beach with anyone but Mary. In light of these and similar observations, which for the case of only and other degree particles such as even, also etc. have first been discussed by Dretske (1972), and for the case of adverbial quantifiers like always, usually etc. by Rooth (1985), it has been suggested by many researchers that the respective items are focus sensitive operators, i.e. operators whose denotations are directly sensitive to the
structuring of the clauses they occur in into focus and background (Jacobs 1983, Rooth 1985, von Stechow 1989, Krifka 1992, Herburger 2000). A second line of research attempts to explain the observed truth conditional effects in a different way, namely as an optional association of the (underspecified) interpretation of the respective operators with the information provided by focus marking (von Fintel 1994, Roberts 1996, Geurts and von der Sandt 1997, Schwarzschild 1997; Rooth 1992 argues for an intermediate position). Finally, a third position is argued for by Beaver & Clark (2003, 2008): they present evidence for treating only as a focus sensitive operator, and always as an operator whose association with focus is only a pragmatically driven default option that can be overridden by other factors.

Concerning the first line of research, I will briefly sketch the analysis of Rooth (1985). He assumes that operators such as only and always take the focus semantic value of a sentence (minus the operator, that is) as their first argument, the restrictor, and the ordinary semantic value as their second argument, the nuclear scope. In the case of (31a) and (32a), for example, the focus semantic value (see section 3.2) is a set of proposition that only differ from each other with respect to the place where Peter goes with Mary, i.e. a set such as \{[[Peter goes to the beach with Mary]], [[Peter goes to the park with Mary]], [[Peter goes to the cinema with Mary]] ... \}. Rooth (1985) now assumes that only is a propositional operator which yields the following truth conditions when it is applied to the ordinary semantic value p and the focus semantic value R of a sentence S:

\[
\forall r \text{ } [r \in R \land r \neq p \rightarrow \text{false}(r)]
\]

Both (31a) and (32a) are thus true if among the relevant alternatives no other proposition than ‘Peter went to the beach with Mary’ is true, where the difference in truth conditions comes about because the respective alternative sets R are different, due to focus marking: in the first case the propositions vary with respect to the location where Peter goes with Mary, while in the second case they vary with respect to the person that accompanies Peter to the beach. Concerning always, in contrast, Rooth assumes that it is a quantifier over situations. It
can therefore not operate directly on the focus semantic value, which is a set of propositions. Rather, set union has to be applied, which in the case of (31b) for example gives us the proposition that Peter either went to the beach or to the park or to the cinema etc. with Mary, i.e. the proposition that Peter went somewhere with Mary. This proposition is now assumed to characterize the situations in the restrictor of *always*, while the ordinary semantic value is assumed to characterize the nuclear scope. The truth conditions of (31b), for example, can thus be paraphrased as follows: all situations where Peter goes somewhere with Mary are situations where he goes to the beach with Mary. Since the respective focus semantic value determines the situations quantified over, the truth conditions are correctly predicted to depend on focus marking.

Concerning the second line of research, which assumes association with focus to be not directly encoded in the lexical entries of the operators, but to come about via indirect pragmatic processes in the default case, I will briefly sketch the theory of von Fintel (1994), which essentially differs from Rooth’s only in the following respect: the restrictor of the respective operators is filled by a free variable ranging over sets of propositions (in the case of *only*) or over situation predicates, i.e. propositions (in the case of *always* and other adverbs of quantification such as *usually*, *often* etc.). The respective variables now have to be resolved on the basis of contextually available information. Since the alternatives making up the focus semantic value have to be determined on the basis of contextual information, too, the value for the respective C-variable can in the default case be identified with the focus semantic value/the object generated by applying set union to the focus semantic value. As already mentioned above, Beaver & Clark (2003, 2008) represent a third line of research insofar as they assume that a theory along the lines of Rooth (1985) is suitable for the case of *only*, while one along the lines of von Fintel (1994) is suitable for the case of *always* (and presumably other adverbs of quantification). This conclusion is based on a variety of tests which show that while association with focus can be overwritten by other factors in the case
of *always*, it holds strictly and furthermore has to obey tighter constraints in the case of *only*.

For reasons of space, I can only illustrate their case with a few examples. First, in contrast to *always*, *only* has to c-command the focus marked constituent it associates with:

(34)  
    a. PETER always goes to the beach with Mary.
    b. *PETER only goes to the beach with Mary.

Second, while *always* can also associate with phonetically reduced (or extracted) material, this is impossible for *only*, as shown by the contrast between (34a) and (34b) (from Beaver & Clark 2003: 343), which are assumed to be uttered in a context where the speaker is asked how often the person he talked about with Sandy was Fred:

(34)  
    b. # I [only]F discussed ‘im with Sandy.

Third, in contrast to *only*, the restrictor of *always* can sometimes be determined on the basis of lexical presuppositions instead of the focus, as shown by the fact that the preferred interpretation of (35) (from Beaver & Clark 2003: 235) is the one in (a.), not the one in (b.), while in the case of (36), the interpretation in (b.) is the only one available. The presupposition associated with *complete* thus overrides the effect of focus marking in the case of *always*, while it is unable to do so in the case of *only*:

(35)  
    Mary always managed to complete her [exams]F.
    a. ‘Whenever Mary took exams, she completed them.’
    b. ‘Whenever Mary completed something, it was invariably an exam.’

(36)  
    Mary only managed to complete her [exams]F.
    a. *‘What Mary did when taking exams was complete them and nothing else.’
    b. ‘What Mary completed was an exam and nothing else.’

*Focus and determiner quantification*

In the last section, we have discussed two operators whose arguments are not entirely determined by the syntax, and which therefore have to rely on other mechanisms to obtain
their restrictor: either by direct association with focus, or by searching a suitable value that
the free variable which initially makes up their restrictor can be resolved to, where the
information provided by focus marking is made use of by default. Let us now turn to
quantificational determiners such as every, a, some, more than three etc., which according to
the by-now standard view take two expressions denoting sets of individuals as arguments
and map them onto a proposition that is true if the respective sets stand in a certain lexically
specified relation to each other (see Barwise & Cooper 1981). Here, matters are different: the
first argument, i.e. the restrictor, is the denotation of the NP-complement of the
quantificational determiner. The second argument, i.e. the nuclear scope is the denotation of
the syntactic sister of the entire DP if the DP is in subject position. Since the subject
quantificational DP is the highest argument of the respective verbal predicate, its sister is
guaranteed to be of the right type – namely a one-place predicate, i.e. (the characteristic
function of) a set of individuals. Consider the examples in (37a, c):

(37) a. \([TP_{DP} \{NP\text{-dolphin}\}]_{T^*}\text{is smart}].\)
   b. \(\{x: \text{dolphin}(x)\} \subseteq \{y: \text{smart}(y)\}\)
   c. \([TP_{DP} \{NP\text{-dog}\}]_{T^*}\text{bit my sister}].\)
   d. \(\{x: \text{dog}(x)\} \cap \{y: \text{bit-my-sister}(y)\} \neq \emptyset\)

In the case of (37a), the proposition is true if the set of dolphins is a subset of the set of smart
entities (as shown in (37b)), while in the case of (37c), the proposition is true if the
intersection between the set of dogs and the set of entities that bit my sister is non-empty (as
shown in (37d)). With quantificational DPs in object position, the syntax-semantics mapping
is less straightforward, since in these cases the sister of the respective DP is a transitive verb,
i.e. (the characteristic function of) a set of pairs of individuals. One very popular solution to
this problem is to assume that quantificational DPs can be moved away from their base
position at LF and adjoin to the TP-node via Quantifier Raising (QR) (cf. May 1985). Under
the additional assumptions that the trace left behind by the quantificational DP is interpreted
as a variable of type $e$, and that a lambda-operator binding this variable is inserted directly beneath the moved DP, the sister of this DP is again of the right type for it to function as the second argument of the D-quantifier (cf. Heim & Kratzer 1998 for discussion), as shown below:


    b. LF: $[\text{TP} \lambda_i [\text{TP} \text{Paul owns } t_i]]$

    c. $\{x: \text{book-by-John-Updike}(x)\} \subseteq \{y: \text{owns}(y)(\text{Paul})\}$

The important point for our current purposes is that in general the arguments of quantificational determiners are strictly determined by (LF-)syntax. While prosodic as well as contextual information might have an influence on the truth conditions of sentences containing two or more quantificational DPs (see below), there is no way for this kind of information to alter the order in which a quantificational determiner such as every is combined with its two arguments: the NP-complement of a quantificational determiner can never be interpreted as its nuclear scope, while the sister of the entire DP is interpreted as the restrictor. Consequently, even if we put a strong focal accent on dolphin in (37a) or on book in (38a), the sentences still do not mean that every smart being is a dolphin or that everything that John owns is a book by John Updike.

Nevertheless, there are two types of examples which at first sight seem to be problematic for the view that determiner quantification is not influenced by information structural notion such as focus marking. First, it has been observed by Krifka (1990) (see also Partee 1991, 1999) that in examples like (39a) the truth conditions are influenced by focus marking in the sense that the restrictor consists not only of the NP-complement of the quantificational determiner, but also of the non-focal material in the rest of the sentence, as shown by the paraphrase in (39b):

(39)   a. Most ships passed through the lock [at NIGHT].

    b. ‘Most ships that passed through the lock passed through the lock at night.’
This, however, does not show that *most* is a focus-sensitive operator, since it can easily be accounted for via assumptions about the influence of the context on the interpretation of quantificational DPs that are by now rather standard (cf. Beaver & Clark 2008). It is well known that the restrictor of quantificational determiners in many cases is not only determined by overtly given material (i.e. the respective NP), but also by contextually salient information: if I utter a sentence such as *Most students understood Lewis’s theory of counterfactuals* in the context of a discussion of a class on conditionals that took place yesterday, it need not be the case that more than fifty percent of the students in the whole world understood Lewis’s theory for the sentence to be true. Rather, it suffices that more than half of the students in my class got it. Observations such as these can easily be explained if it is assumed that quantificational determiners come with a free variable ranging over predicates that is intersected with the denotation of the NP they take as their first argument, and which is resolved on the basis of contextually salient information (von Fintel 1994; see also Stanley 2000 and Martí 2003 for additional discussion). Now, in the case of (39a), everything except the PP *at night* is de-accented, indicating its status as given information. From this, the hearer can conclude that the existence of ships passing through the lock is contextually salient information, and the free variable in the restrictor of *most* can accordingly be resolved to the predicate $\lambda x. \text{passed\_through\_the\_lock}(x)$, which gives us the desired result.

More problematic for the view that there is no direct influence of focus marking on the truth conditions of sentences with quantificational DPs is the existence of examples such as (40a, b) (from Herburger 1997, 2000; see Westerståhl 1985, Herburger 1992, Eckardt 1999 for the initial observations):

(40) a. Many SCANDINAVIANS won the Nobel prize in literature.
    b. Few COOKs applied.

According to Herburger (1997, 2000), focussing Scandinavians and cooks, respectively,
makes available the readings paraphrased in (41a, b), where the argument order that is normally obligatory for quantificational determiners has apparently been switched: the VPs won the Nobel Prize in literature and applied are interpreted in the restrictor, while the NPs Scandinavians and cooks are interpreted in the nuclear scope.

(41) a. Many of the winners of the Nobel Prize in literature were Scandinavians.

b. Few of the people that applied were cooks.

Crucially, such reversed readings are not available to strong quantifiers such as all/most/all but four: the sentences in (42) cannot be interpreted as saying that all/most/all but four of the people who won the Nobel Prize in literature are Scandinavians. Note that other than many and few, weak quantifiers (i.e. ones that can occur in there-insertion contexts such as there were three/many/few/no Scandinavians) cannot be tested this way, since they are all symmetrical: three/no philosophers arrived has the same truth conditions as three/no people who arrived were philosophers.

(42) All/Most/All but four SCANDINAVIANS won the Nobel Prize in literature.

From these observations Herburger (1997, 2000) concludes that in contrast to strong quantifiers, the arguments of weak quantifiers are determined on the basis of focus marking, but that this effect is only visible in the case of the weak proportional quantifiers many and few. Cohen (2001) argues for a different view, according to which it is not necessary to reverse the order of the arguments that many and few combine with. Nevertheless, he still assumes that the alternatives evoked by placing the main accent on some element within the respective NP directly enter the process whereby the truth conditions of the sentences are computed. He assumes that many and few both have relative proportional readings which are computed in the following way: the proportion of the individuals satisfying both restrictor and nuclear scope among those satisfying the restrictor is compared to the proportion of individuals satisfying both any of the alternatives to the restrictor and the nuclear scope among those satisfying any of the alternatives to the restrictor. In the case of
of many, the respective sentence is true if the first proportion is greater than the second, while
in the case of few, the first proportion needs to be smaller than the second. Applying this
method to our example (40a), we get truth conditions that can be paraphrased as follows:
among the Scandinavians, the proportion of Nobel Prize winners in literature is greater than
among people in general (i.e. among individuals who satisfy any of the relevant alternatives
and are thus either Scandinavian or French or Chinese etc.).
According to Beaver & Clark (2008: 58 ff.; see also Büring 1996), the relevant truth
conditions can also be obtained without having to assume direct focus sensitivity of many
and few. They assume that in order for a sentence with many to be true, either the proportion
of people satisfying both restrictor and scope among those satisfying the restrictor or the
number of people satisfying both restrictor and scope has to be higher than expected, while
in the case of few, it has to be lower. What is expected is given in the form of either a
proportion or an absolute number $\alpha$ that is determined by the context. Now, since focus on
some part of the respective NP evokes a set of alternative propositions, it is natural for the
hearer to assume that at least some of these alternatives are false, while the proposition
actually uttered is true (see above). The value for $\alpha$ thus has to be chosen accordingly, i.e. in
the case of (40a), for example, it has to be chosen in such a way that it allows the proportion
of Nobel Prize winners in literature among the Scandinavians to exceed it, while the
proportions of winners among the French, Chinese, etc. are below it. This gives us the
desired result, since the alternatives evoked by focus marking play a decisive in determining
the value for $\alpha$, and this creates the impression of direct focus sensitivity.
In section 5 we have discussed some cases where focus marking has an influence on the
truth conditions of sentences. It has turned out that in most cases (exhaustive focus in
Hungarian, adverbial quantifiers, and determiner quantification in general) the observed
effects can be explained as indirect effects insofar as an underspecified element in the
denotation of some operator is resolved on the basis of clues given by focus marking. On the
other hand, we have seen that there are operators like *only* which are most plausibly analysed as directly focus sensitive (see Beaver & Clark 2008 for a thorough investigation of the class of focus sensitive operators). In the next section we will discuss truth conditional effects of topic marking.

6. Truth conditional effects of topic marking

*Aboutness topicality*

As already mentioned in section 3, in most cases marking a constituent as an aboutness topic does not have an observable truth conditional effect: first, there are no operators which seem to be topic sensitive in a sense comparable to focus sensitive operators such as *only*. While it has been claimed by Partee (1991, 1999) that adverbial quantifiers are sensitive to information structure insofar as topical material is interpreted in their restrictor while focal material is interpreted in their nuclear scope, we have already seen in section 5 that the observed effects can also be explained without having to assume such a direct sensitivity.

Second, in most cases the constituent marked as the aboutness topic denotes an object of type *e* and is therefore unable to take scope anyway. But as soon as we turn our attention to indefinites headed by unmodified determiners – which are the only quantifiers that can appear in constructions marking aboutness topicality overtly such as GLD – , the picture changes: in contrast to the fronted indefinite in (43a), the left-dislocated one in (43b) can only be interpreted with scope over *jeder* (*everyone*). This is shown by the fact that while both the continuation in (43c) and the one in (43d) are possible for (43a), only the one in (43c) is possible for (43b).

(43)  a. Einen Song von Bob Dylan kennt jeder.
     a/one-ACC song by knows everybody
     ‘Everybody knows a /one song by Bob Dylan.’

     a/one-ACC song by RP-MASC.NOM.SING knows everybody
‘There is a /one song by Bob Dylan that everybody knows.’

c. Nämlich Blowing in the Wind.

d. Maria kennt Visions of Joanna, Peter kennt Everybody Must Get Stoned, und

Paula kennt Blowing in the Wind.

At first sight, examples such as (44a), where a pronoun contained within the left-dislocated indefinite can be interpreted as bound by a quantifier from within the matrix clause, seem to falsify the claim that left-dislocated indefinites have to be interpreted with widest scope.

Endriss (2009) shows, however, that the indefinites do not really receive narrow scope, but rather functional wide scope. This is evidenced by the fact that the continuation in (44b), which names a function (namely the function that maps pupils onto a picture of their first day at school), is fine, while the one in (44c) is odd:

(44) a. Ein Bild von sich, das hat jeder Schüler

A picture of himself RP.NEUT.SING has every pupil mitgebracht.

b. Nämlich sein Einschulungsfoto.

Namely his picture-of-his-first-day-at-school.

‘Namely a picture of his first day at school’.

c. #Paul ein Bild von sich mit seiner Tante,

Paul a picture of himself with his aunt,

Peter ein Bild von sich mit seiner Katze,...
Nevertheless, while being unable to be interpreted in the scope of other quantificational DPs, left-dislocated indefinites nevertheless do not always have to be interpreted with widest scope. As shown by (45a), they can be interpreted in the restrictor of adverbial quantifiers (but not in the nuclear scope): the sentence is most naturally interpreted in a way that can be paraphrased as “most dogs are smart”. Finally, (45b) shows that left-dislocated indefinites are also capable of receiving generic readings: the sentence cannot only be interpreted as a statement about a particular dog, but also as a statement about dogs in general.

(45) a. Ein Hund, der ist meistens schlau.
    a dog RP-MASC.NOM.SING is usually smart

    b. Ein Hund, der ist schlau.
    a dog RP-MASC.NOM.SING is smart

In order to capture all these interpretative possibilities, Endriss & Hinterwimmer (2009; see also Endriss 2009) argue for a formal implementation of the aboutness concept of Reinhart (1982) that can roughly be described as follows: first, the (denotation of the) left-dislocated constituent is established as the topic in a separate speech act (cf. Searle 1969 and Jacobs 1984), which corresponds to the creation of an address. This first speech act is then combined via speech act conjunction with a second speech act, in which it is asserted that the comment holds of the topic, and which corresponds to the storage of the information provided by the respective sentence under the address created for the topic. Now, in cases such as (46a), where the topic is an object of type e, i.e. an individual, this is completely unproblematic: assuming that the resumptive pronoun in the specifier of the matrix-clause CP behaves like a relative pronoun in a relative clause insofar as it triggers lambda abstraction (Heim & Kratzer 1998), the whole matrix clause can be interpreted as a predicate that applies to the topic. The resulting interpretation is given schematically in (46b). Note that with respect to the truth conditions, it does not differ from the interpretation of the corresponding sentence in (46c) where Peter is not explicitly marked as the aboutness topic.
receives, which is given in (46d):

(46)  a. (Den)  Peter,  den  mag  ich.
     (the-ACC)    RP-MASC.ACC.SING  like  I
     ‘Peter, I like.’

b. ∃α[α = Peter & ASSERT [λs. like(I, α(s))]]

c. Ich  mag  (den)  Peter.
     I  like  (the-ACC)

d. like(I, peter)

In cases where an indefinite is marked as the aboutness topic, things are not so simple. First, Endriss & Hinterwimmer (2009) assume the generalized quantifiers, i.e. sets of sets of individuals, in contrast to individuals and sets are too complex objects to serve as addresses for storing information. Second, the predicate denoted by the matrix-CP cannot be applied to them, i.e. they cannot be interpreted as the logical subject of this predicate, which would have to be of type <(e,t)>t> for this to be possible. Therefore, the type of the generalized quantifiers has to be lowered via typeshifting. Let us first consider the case of (43a): in order to serve as an address for storing the information provided by the rest of the sentence, the indefinite has to be lowered to the type of sets at least. This can be done in the following way: a representative of the quantifier in the form of a minimal witness set (in the sense of Barwise & Cooper 1981; see also Szabolcsi 1997) is created, where a minimal witness set of a quantifier is an element of this quantifier that does not contain any "unwanted" elements. The formal definition is given in (47):

(47) Definition of a minimal (witness) set X of a generalized quantifier G:

\[
\min(X)(G) = [G(X) \land \forall Y [G(Y) \rightarrow \neg(\lambda x. Y(x)) \subseteq \lambda x .X(x))]]
\]

In the case of a quantifier like three dogs, for instance, a minimal witness set of this quantifier is a set that contains three dogs and nothing else. Such a minimal witness set can function as the address where the information conveyed by the comment is stored. In order
for this to be possible, however, the denotation of the topic – which now is an object of type \(<e,t>\) – has to be combined with the denotation of the comment, which is of the same type. Furthermore, the intuition has to be respected that the topic is the logical subject of the predicate denoted by the comment. This can be achieved in the following way: an operator \(\sqcap\), which collects the elements of the minimal witness set and turns them into a into a (sum) individual is applied to the respective minimal witness set. Taking all this together, the sentence in (43a) is interpreted as shown in (48):

\[
\exists \alpha [\min(\alpha) (\langle \text{a song by Bob Dylan} \rangle)] \land \text{ASSERT}[\lambda s. \forall y [\text{human}(y) \rightarrow \\
\rightarrow \text{know}(y, \sqcap \{x : \alpha(x)\}(s))]]
\]

This is the correct result. It reflects the wide scope reading for the indefinite and at the same time respects the principle underlying the formalization proposed by Endriss & Hinterwimmer (2009): it allows the creation of an address corresponding to the minimal witness set where the information conveyed by the comment can be stored. Endriss (2009) argues that the need to create a representative in the form of a minimal witness set excludes all generalized quantifiers except indefinites headed by unmodified articles from functioning as aboutness topics, since it leads to unwanted results in all other cases. Furthermore, she argues that exceptional wide scope readings of these indefinites (Fodor & Sag 1982), i.e. readings where they take scope out of islands that generally cannot be crossed by quantifiers, also come about because the respective indefinite is interpreted as the (not overtly marked) aboutness topic.

Let us now turn to the case exemplified by (45a), where an indefinite marked as aboutness topic is interpreted in the restrictor of an adverbial quantifier. In a nutshell, Endriss & Hinterwimmer (2009) argue that the existence of such readings, where the quantificational force of the indefinite seems to vary with the force of the quantificational adverb and which accordingly exemplify a phenomenon dubbed *Quantificational Variability Effect* (QVE)
(Berman 1987), can be reconciled with the need for the indefinite to function as the aboutness topic in the following way: first, the indefinite is applied to the dummy predicate \( \lambda x \lambda s. \text{in}(x)(s) \), which turns it into a situation predicate – in the case of (45a), into the situation predicate \( \lambda s. \exists x [\text{dog}(x) \wedge \text{in}(x)(s)] \). Second, quantificational adverbs are systematically ambiguous between a variant whose restrictor is given in the form of a free variable (see section 5) and one that combines with its arguments in reverse order (from the perspective of determiner quantification), i.e. with the nuclear scope first and then with the restrictor. Note that something like this second variant is needed anyway in order to allow for a compositional derivation in cases where a left-adjointed \textit{when}- or \textit{if}-clause is interpreted in the restrictor of the Q-adverb (cf. Chierchia 1995). Third, the resumptive pronoun, which occupies the specifier of the matrix-CP at the surface, can optionally be reconstructed into its clause-internal base position, where it no longer triggers lambda-abstraction, but rather is interpreted as a free variable. As a free variable, it can be bound dynamically (Groenendijk & Stokhof 1991) by the indefinite ending up in the restrictor of the quantificational adverb.

Taking all this together, we arrive at the following result: in a first step, the left-dislocated indefinite is shifted to a situation predicate which can function as an address for storing the information provided by the rest of the sentence. In a second step, it is asserted that the result of applying the Q-adverb to the situation predicate denoted by the matrix clause (i.e. its nuclear scope) is applied to the situation predicate denoted by the left-dislocated indefinite.

This is shown schematically for (45a) in (49):

(49) \[ \exists \alpha [\alpha = \lambda s. \exists x [\text{dog}(x) \wedge \text{in}(x)(s)] & \]
\[ & \text{ASSERT} [\lambda P. \lambda s. \text{Most } s' [s' \leq s \wedge P(s')]] = \]
\[ \exists \alpha [\alpha = \lambda s. \exists x [\text{dog}(x) \wedge \text{in}(x)(s)]] & \]
\[ & \text{ASSERT} [\lambda s. \text{Most } s' [s' \leq s \wedge \alpha(s')]] = \]
\[ [\exists s'' [s'' \leq s' \wedge \text{smart}(x)(s'')]](\alpha) ] ] ]
The result of combining the Q-adverb with its nuclear scope can be seen as a higher order predicate that specifies the degree to which the nuclear scope applies to its logical subject (the restrictor), i.e. the degree to which the set denoted by the restrictor is included in the set denoted by the nuclear scope. In our example, it is asserted that most elements of the set of situations containing a dog $x$ is included in the set of situations where $x$ is smart. By enforcing the situations quantified over to be minimal in the sense of containing nothing beyond what is necessary to make them a situation satisfying the respective predicate (the minimality conditions have been suppressed for ease of exposition), we get the desired result: since the situations vary with the dogs they contain, the illusion of direct quantification over dogs is created (Berman 1987; von Fintel 1994; Herburger 2000).

Concerning the generic reading exemplified by (44b), Endriss & Hinterwimmer (2009) assume that it is nothing but a special case of the reading exemplified by (45a), where the overt quantificational adverb has been replaced by a covert generic operator with quasi-universal force (see Krifka et al. 1995 and the references cited therein for discussion).

The analysis just sketched can also be applied to sentences with left-dislocated temporal clauses and conditional antecedents (see Iatridou 1994 and Bhatt & Pancheva 2001 for an analysis of if-then-sentences as instances of left-dislocation), since the set of situations/the closest world (Stalnaker 1968 & Schlenker 2004) characterized by the respective clause can be viewed as the aboutness topic in such cases (see Haiman 1978 and Bittner 2001 for the general idea that conditionals are topics). Based on the idea that the establishment of (aboutness) topicality involves a separate speech act, Ebert, Endriss and Hinterwimmer (2009) argue that the difference in truth conditions between regular conditionals such as (50a) and relevance conditionals such as (50b) can be phrased in terms of the difference between two kinds of aboutness topicality: the one discussed in this section, which in German is marked via GLD, and the one exemplified by the so-called hanging topic in (50c):
(50)  a. If you are thirsty, (*then) there is beer in the refrigerator.
    b. If Kim was at the party, (then) it was fun.
    c. As for the pastor, the marriage sermon was wonderful.

Ebert, Endriss and Hinterwimmer (2009) show that what both types of aboutness topicality have in common is the relation of relevance: the information provided by the comment is presented as relevant with respect to the topic, which corresponds to the storage of this information under the address created for the topic. Now, while in the case exemplified by GLD relevance is trivially ensured via the relation of predication, an appropriate relation has to be inferred on the basis of contextual information, world knowledge, etc. in the second case. This accounts for the observed truth conditional difference between (50a) and (50b): while (50b) is automatically understood as conveying that the party’s having been fun depends on the presence of Kim, the beer’s being in the refrigerator is not understood as depending on the addressee’s being thirsty in the case of (50a). Rather, the sentence is understood as conveying that the information that there is beer in the refrigerator is only relevant for the hearer in case s/he is thirsty. In other words, an address is created for the closest world where the addressee is thirsty (which might, or might not be the actual world), and the information that there is beer in the refrigerator in the actual world is stored under this address. In the case of (50a), in contrast, the information that the party was fun in the closest world where Kim was present is stored under the address created for the closest world where Kim was present.

Summarizing the main results of this section, aboutness topicality can have truth conditional effects if the aboutness topic is an indefinite since two requirements have to be met that necessitate typeshifting: first, an object has to be created from the original denotation of the indefinite as a generalized quantifier that can serve as an address for storing the information provided by the rest of the sentence. Furthermore, the rest of the sentence has to function as a (first- or higher-order predicate) that applies to this object. This either leads to an
interpretation that is equivalent to one where the indefinite receives widest scope or (in the
case of adverbially quantified and generic sentences) to an interpretation that is equivalent to
one where the indefinite is interpreted in the restrictor of the quantificational adverb/the
covert generic operator. Furthermore, we have seen that the truth-conditional difference
between regular conditionals and relevance conditionals can be traced back to the difference
between two types of aboutness-topicality only one of which involves predication, while the
other involves an (under-specified) relation of relevance. In the next section, I will deal with
truth conditional effects of contrastive topicality. Concerning frame setting topics, we have
already seen in section 3 that the alleged truth conditional effects does not have anything to
do with the marking of the respective constituents as topics, since leaving them in sentence-
internal position results in exactly the same truth conditions.

Contrastive topicality

In section 3, we saw that the restrictions that keep quantificational DPs other than indefinites
headed by unmodified determiners from functioning as aboutness topics do not apply to
contrastive topics. It is therefore not surprising that we find no evidence for the typeshifting
operations discussed in the last section in sentences where quantificational DPs are marked
as contrastive topics – they do not have to take widest scope in the presence of other
quantificational DPs, and neither do they have to be interpreted in the restrictor of overt or
covert quantificational adverbs. Nevertheless, there is evidence that contrastive topic
marking has an influence on the interpretation of quantificational DPs. It has been observed
that the rise-fall contour indicating contrastive topicality makes available scope-inversion in
configurations where it would normally (i.e. without this contour) be excluded in German
(Jacobs 1982, 1983, 1984; Höhle 1992; Büring 1997a, b; Krifka 1998), as evidenced by the
examples in (51) (from Krifka 1998: 80, ex. (16a, b))

(51) a. JEDER Student hat mindestens EINEN\ Roman gelesen. \(\exists (\forall),\forall (\exists)\)
every-NOM student has at-least one-ACC novel read

b. Mindestens /EIN Student hat JEDEN\ Roman gelesen. \(\exists (\forall), \forall (\exists)\)
at-least one-NOM student has every-ACC novel read

As indicated, both sentences are ambiguous: (51b), for example, may either be true if there is one student that read every book, or if every book was read by a different student. This is exceptional for German, where the word order is freer than in English, and where accordingly only sentences where the canonical word order has been altered are scope-ambiguous. Frey (1993) accounts for this fact by assuming that in German (and other languages with relatively free word order such as Hungarian) an operator \(\alpha\) may only be interpreted with scope over an operator \(\beta\) if \(\alpha\) either c-commands \(\beta\) or a trace of \(\beta\). Now, in (51a, b) the subject c-commands the object on the surface, which is the canonical word order. There should thus be no reading where the object has wider scope, contrary to fact. Krifka (1998) now assumes that the additional scope options brought into play by contrastive topic marking of the higher operator result from complex derivations involving several invisible movement operations. Consequently, the higher operator leaves behind traces that are c-commanded by the surface position of the lower operator, which allows the latter to take scope over the former, in accordance with Frey’s assumptions. Let us have a closer look at the derivation Krifka assumes for (52b) (Krifka 1998: 11). The crucial steps are given in (52): first, after the finite auxiliary verb has moved to C\(^0\) (as shown in (52b)), the direct object DP is scrambled across the subject DP (as shown in (52c)). Then, the subject DP receives focus marking in its derived verb adjacent position (as shown in (52d)) and is moved to the specifier of CP (as shown in (52e)). According to Krifka, the latter movement operation “has a specific discourse pragmatic function, contrastive topicalization” (Krifka 1998: 11). Finally, the object DP receives focus marking in its derived verb adjacent position (as shown in (52f)).

(52)  a. \([_{CP}\ e\ [c_{-}\ e\ [\text{mindestens ein Student [jeden Roman [gelesen]] hat]}]]\)
b. \([CP\ e\ [C'\hat{\text{hat}}_1\ [\text{mindestens ein Student} [\text{jeden Roman} [\text{gelesen}]]\ t_1]]]\)

c. \([CP\ e\ [C'\hat{\text{hat}}_1\ [\text{jeden Roman}_2\ [\text{mindestens ein Student} [t_2 [\text{gelesen}]]]\ t_1]]\)

d. \([CP\ e\ [C'\hat{\text{hat}}_1\ [\text{jeden Roman}_2\ [[\text{mindestens ein Student}]_F\ [t_2 [\text{gelesen}]]]\ t_1]]\)

e. \([CP\ [\text{mindestens ein Student}]_{F,3}\ [C'\hat{\text{hat}}_1\ [\text{jeden Roman}_2\ [t_3\ [t_2 [\text{gelesen}]]]\ t_1]]\)

f. \([CP\ [\text{mindestens ein Student}]_{F,3}\ [C'\hat{\text{hat}}_1\ [[\text{jeden Roman}]_{2,F}\ [t_3\ [t_2 [\text{gelesen}]]]]\ t_1]]\)

g. \([CP\ \text{Mindestens /EIN}\ \text{Student} [C'\hat{\text{hat}}_1\ [\text{JEDen} \ \text{Roman} [\text{gelesen}]]]]\)

Now, the crucial movement operation is the one shown in (52c), which brings the object DP into a position from where it c-commands a trace left behind by the subject DP and thus allows it to take scope over the subject DP. According to Krifka, it is motivated as follows: first, as already mentioned in section 3, contrastive topicality is a combination of aboutness topicality and focus marking. Second, focus is preferably assigned to preverbal constituents in German. This forces the object DP to move across the subject DP, since otherwise the subject DP would not be in the right position for focus marking.

While we have seen that there are good reasons to doubt Krifka’s assumption that contrastive topicality involves aboutness topicality, it is nevertheless reasonable to assume that it involves focus marking, since both contrastive topic marking and focus marking can fruitfully be analysed in terms of the introduction of alternatives, as we have seen above.

Furthermore, Krifka (1998: 87-97) discusses a whole battery of empirical observations which support the assumption that focus is preferably assigned to constituents in preverbal position in German. His account of how contrastive topicality makes available scope options that otherwise would not exist in German is thus by and large well motivated, leaving only the “altruistic” scrambling of the object DP shown in (52c) as an assumption that is problematic from the point of view of the highly influential Minimalist Program inaugurated by Chomsky (1995), according to which all movement operations are feature-driven. Note,
however, that the existence of scrambling is problematic for this view, anyway, since there does not seem to be any independent motivation for postulating a feature that all scrambled elements share and that needs to be checked. It is thus more promising to analyse scrambling as an option that is in principle freely available, but which is only employed if it has any payoffs at either of the interfaces (cf. Reinhart 2006), which is compatible with Krifka’s account.

A related pattern, where contrastive topicality has an influence on the truth conditions of sentences containing scope taking elements, is discussed by Büring (1997b): as has been observed by Jacobs (1984) and Löbner (1990), the two sentences in (53) only have a reading according to which the lower higher operator takes scope over the higher one – i.e. (53a) can only be interpreted as saying that it is not the case that all politicians are corrupt, and (53b) as saying that the addressee does not have to smoke so much.

(53) a. /ALLE Politiker sind NICHT\ korrupt.
   All politicians are not corrupt
b. Du /MUSST NICHT\ so viel rauchen
   you must not so much smoke

Based on the theory of contrastive topicality proposed by Büring (1997a), Büring (1997b) offers a pragmatic account of this pattern. He starts from the assumption that the two sentences in (53) are structurally ambiguous at LF at latest, which is compatible with Frey’s (1993) assumptions discussed above, since negation may in both cases have been base generated in a position where it c-commands the base position of the other operator. Now recall from section 3 that contrastive topic marking introduces a set of set of propositions where both the denotation of the constituent marked as the contrastive topic and the one marked as the focus have been replaced by alternatives. If in the case of (53a), for example, the universally quantified DP is interpreted with scope above negation, we get the set shown in (54a), and if it is interpreted with scope beneath negation, we get the set in (54b):
(54) a. \{\{\text{all}(\text{politicians})(\lambda x. \neg \text{corrupt}(x)), \text{all}(\text{politicians})(\lambda x. \text{corrupt}(x))\},
\{\text{most}(\text{politicians})(\lambda x. \neg \text{corrupt}(x)), \text{most}(\text{politicians})(\lambda x. \text{corrupt}(x))\},
\{\text{some}(\text{politicians})(\lambda x. \neg \text{corrupt}(x)), \text{some}(\text{politicians})(\lambda x. \text{corrupt}(x))\},
\{\text{one}(\text{politician})(\lambda x. \neg \text{corrupt}(x)), \text{one}(\text{politicians})(\lambda x. \text{corrupt}(x))\},
\{\neg \text{all}(\text{politicians})(\lambda x. \text{corrupt}(x)), \text{all}(\text{politicians})(\lambda x. \text{corrupt}(x))\},
\{\neg \text{most}(\text{politicians})(\lambda x. \text{corrupt}(x)), \text{most}(\text{politicians})(\lambda x. \text{corrupt}(x))\},
\{\neg \text{some}(\text{politicians})(\lambda x. \text{corrupt}(x)), \text{some}(\text{politicians})(\lambda x. \text{corrupt}(x))\},
\{\neg \text{one}(\text{politician})(\lambda x. \text{corrupt}(x)), \text{one}(\text{politicians})(\lambda x. \text{corrupt}(x))\},
\{\neg \text{no}(\text{politician})(\lambda x. \text{corrupt}(x)), \text{no}(\text{politicians})(\lambda x. \text{corrupt}(x))\}\}

b. \{\{\neg \text{all}(\text{politicians})(\lambda x. \neg \text{corrupt}(x)), \text{all}(\text{politicians})(\lambda x. \text{corrupt}(x))\},
\{\neg \text{most}(\text{politicians})(\lambda x. \neg \text{corrupt}(x)), \text{most}(\text{politicians})(\lambda x. \text{corrupt}(x))\},
\{\neg \text{some}(\text{politicians})(\lambda x. \neg \text{corrupt}(x)), \text{some}(\text{politicians})(\lambda x. \text{corrupt}(x))\},
\{\neg \text{one}(\text{politician})(\lambda x. \neg \text{corrupt}(x)), \text{one}(\text{politicians})(\lambda x. \text{corrupt}(x))\},
\{\neg \text{no}(\text{politician})(\lambda x. \neg \text{corrupt}(x)), \text{no}(\text{politicians})(\lambda x. \text{corrupt}(x))\}\}

Now observe that there is a crucial contrast between the two sets. In the case of (54b), asserting the proposition corresponding to the first element of the first set only eliminates the second element of the first set as an option that is still open: while it cannot possibly be the case that all politicians are corrupt and that not all politicians are corrupt, we can neither conclude that it is the case that most politicians are corrupt nor that it is not the case that most politicians are corrupt from the fact that not all politicians are corrupt, and the same holds for all the other quantifiers listed above. In the case of (54a), in contrast, asserting the proposition corresponding to the first element of the first set automatically decides the question of which of the two elements in each set is true for all the other sets: as soon as we know that all politicians are not corrupt, we automatically know that most politicians are not corrupt, that some politicians are not corrupt and that it is not the case that no politician is not corrupt, i.e. that no politician is corrupt. As the reader can easily check for herself, the same reasoning applies to (53b). Büring (1997b) now assumes that contrastive topic marking is subject to the following pragmatic constraint: after a sentence A has been uttered, there must at least be one disputable element in the set corresponding to the topic semantic value
of A, where a set of propositions \( P \) is disputable with respect to the Common Ground if it contains at least one element \( p \) such that both \( p \) and \( \neg p \) could informatively and coherently be added to the Common Ground. Since in the case of (53a) as well as (53b) the reading where the higher operator has scope above negation violates this constraint, it is correctly predicted that only the reading where negation takes higher scope is available.

This account is very attractive insofar as it comes at practically no cost at all: apart from the independently well-supported assumption that contrastive topic marking introduces a set of sets of alternative propositions, Büring only needs the disputability constraint. This constraint is extremely natural, however, since it simply formalizes the idea that there has to be a point in introducing such a complex semantic object as the topic semantic value of a sentence: if the truth value of all alternatives to the ordinary semantic value of the respective sentence is already decided on via entailments of the ordinary semantic value, there simply is no point in introducing these alternatives in the first place. Note, however, that in spite of its attractiveness Büring’s account cannot replace the one of Krifka (1998), since it only works for a limited set of data. We thus need both to account for the full range of facts.

In this section we have seen that while contrastive topic marking can have an influence on the truth conditions of sentences containing multiple scope taking elements, these effects do not show that truth conditional semantics is directly sensitive to contrastive topicality. Rather, they can naturally be explained as indirect effects of either formal requirements that contrastive topic marking is subject to, or of a pragmatic principle that requires the introduction of the topic semantic value of a sentence to fulfil some communicative purpose.

In the next section we will briefly discuss the question of whether there is any interaction between givenness marking and truth conditional semantics.

7. Givenness and truth conditions

In section 3 we have seen that there are good reasons to reject the idea that adverbial quantifiers like *always* and quantificational determiners like *most, many* and *few* are directly
focus sensitive. Rather, the observed effects can be better explained by assuming that all of these operators introduce a free variable as part of their denotation which needs to be resolved on the basis of contextually available information. Focus marking, which allows the reconstruction of implicit questions under discussion, is important in the task of finding suitable values for these variables insofar as it often gives a clue as to which part of the respective sentence counts as contextually available information. This does not show, however, that the operators which have been analysed as focus sensitive should be analysed as directly sensitive to givenness instead, since there is no reason to assume a grammaticalized dependency on constituents marked as given (by phonological, morphological, or syntactic means), as shown by the fact that in some instances (such as example (35) discussed in section 5) even focal material can be interpreted in the restrictor of an adverbial quantifier.

Apart from the operators just mentioned there is a whole class of expressions which depend on (directly or indirectly) given information insofar as they only yield a defined value if the context in which they are uttered satisfies certain conditions: namely all so-called presupposition triggers such as the definite article, factive verbs like realize and regret, implicative verbs like manage etc. (see [] for detailed discussion). However, in these cases, too, there is no grammaticalized sensitivity to constituents that are explicitly marked as given: it does not matter whether the required information is given explicitly or implicitly in the discourse, is part of the shared background knowledge of the discourse participants, or can be accommodated. There is thus no evidence for a direct influence of givenness marking on the truth conditions of sentences.

8. Conclusion

In this paper I have discussed the relation between information structure and truth conditional semantics, concentrating on the question of whether there is any direct
interaction between the various information structural dimensions and operators such as quantified DPs and quantificational adverbs. Concerning the focus-background dimension, we have seen that in most cases truth conditional effects do not result from direct focus sensitivity of the involved operators, but rather come about as indirect effects of the need to resolve a free variable that is present in the denotation of these operators on the basis of contextual information – with the notable exception of exclusives such as only (cf. Beaver and Clark 2008).

Concerning the topic-comment dimension, I have argued that in cases where a quantificational DP functions as the aboutness topic of a sentence, the need to interpret the comment as a predicate that can be applied to the topic has truth conditional effects in the presence of either another quantificational DP, a quantificational adverb or generic tense (Endriss & Hinterwimmer 2009). In cases where a quantificational DP is marked as a contrastive topic, on the other hand, truth conditional effects come about indirectly – either because the alternatives thus introduced could not be put to use otherwise (Büring 1997b), or because contrastive topic marking results in a more complicated syntactic derivation that opens up additional scope possibilities (Krifka 1998).

Finally, concerning the given-new dimension, there is no evidence for a direct influence on the truth conditions of sentences, but only for indirect effects that come about in basically the same way as the above mentioned indirect effects of focus marking.

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