A Unified Analysis of Conditionals as Topics *

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Abstract

We bring out syntactic and semantic similarities of two types of conditionals with fronted antecedents (*normal indicative conditionals* (NCs) and *biscuit conditionals* (BCs)) and two types of left dislocation constructions in German (*German left dislocation* and *hanging topic left dislocation*), which mark two types of topicality (*aboutness topicality* and *relevance topicality*). On the basis of these similarities we argue that (the antecedent *if*-clauses of) NCs and BCs are aboutness topics and relevance topics, respectively.

Our analysis extends the approach to aboutness topicality of Endriss (2009) to relevance topics to derive the semantic and pragmatic contribution of left-dislocated DPs and applies it to an analysis of conditionals as (maximal) pluralities of possible worlds. We show how this uniform approach

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to the interpretation of topicality accounts for the nominal left dislocation constructions as well as for the semantic and pragmatic effects observed in connection with the two types of conditionals.

We furthermore discuss the potential of our proposal to deal with subjunctive biscuit conditionals, *if*-clauses modifying speech acts different from assertions, conditionals with right-dislocated *if*-clauses and nested conditionals.

1 Introduction

Consider the two indicative conditional sentences in (1) and (2).

(1) If Peter went shopping, then there is pizza in the fridge.

(2) If you are hungry, there is pizza in the fridge.

The indicative conditional in (1) receives a reading where the truth of the consequent depends on the truth of the antecedent. While it is neither asserted that there is pizza in the fridge nor that Peter went shopping, what is asserted is that there is a connection between Peter's shopping and there being pizza in the fridge: it cannot be the case that Peter went shopping and there is no pizza in the fridge.

In (2), in contrast, the consequent is asserted independently of the truth of the antecedent. The speaker commits herself to the truth of there being pizza in the fridge, whether the addressee is hungry or not. The antecedent *if*-clause merely presents conditions when the consequent is *relevant* to the hearer. Only if he is hungry is it relevant to him that there is pizza in the fridge.

These two readings of indicative conditionals have been under linguistic scrutiny at least since Austin (1961) put forth his seminal example for a conditional with the second type of reading.

(3) There are biscuits on the sideboard if you want them.

Following common practice we will make use of the edible substance in Austin's example and call a conditional sentence with this second type of reading a *biscuit conditional (BC)*. In contrast, we will call a conditional with the first type of truth-dependence reading a *normal conditional (NC)*.

A frequently made observation is that the presence of *then* plays a crucial role with respect to the availability of readings. While a conditional sentence such as (1) retains its NC reading when *then* is omitted (4), a conditional such as (2) inevitably turns into an NC with a pragmatically odd reading when *then* is present (5).

(4) If Peter went shopping, there is pizza in the fridge.

(5) # If you are hungry, then there is pizza in the fridge.

Hence, the presence of *then* enforces an NC reading, while its absence does not give any indication as to whether the conditional is to be read as an NC or a BC. A unified semantics of these two types of conditionals therefore has to provide an explanation of the observed truth-conditional dependence of the antecedent

and consequent clause in the case of NCs and their looser connection of *relevance* in the case of BCs, as well as of the role of *then* in enforcing the NC reading.

While we make the standard assumption that propositions are sets of possible worlds, concerning conditionals we will make use of a referential analysis and regard them as definite descriptions over possible worlds, based on (Stalnaker, 1968; Schein, 2001; Schlenker, 2004; Klinedinst, 2007). In particular, we assume the following.

(6) The antecedent of an NC is interpreted as a (semantically plural) definite description referring to the maximal plurality of possible worlds W that

1. is compatible with everything the speaker knows in the world of evaluation[1] w_0, and that
2. makes the proposition expressed by the antecedent true.

The consequent is then evaluated w.r.t. each world in W, i.e. the truth of an NC depends on whether the proposition expressed by the consequent is true in all atomic parts of the maximal plurality of W.

We assume that (a) there are mereological sums of possible worlds (just as there are mereological sums of individuals), and (b) that world predicates (i.e. propositions) may be pluralized (just as individual predicates may be pluralized) in the sense of (Link, 1983)[2].

The pluralization of a proposition p is indicated by a prefixed star as ${}^*p$ and the selection of a maximal plurality among a set of pluralities by application of the sigma-operator $\sigma(p)$. In the appendix we will give formal definitions of the operators, but for the moment a helpful approximation is to think of a plurality simply as a set of worlds, of ${}^*p$ as the predicate that is true of a set of worlds if and only if p is true of every world in this set, and of $\sigma(p)$ simply as p itself.

To illustrate, the representation for (1), repeated as (7a), is as given in (7c)[3]. Here R_{ep} denotes the epistemic accessibility relation of the speaker, i.e. $\lambda w.R_{\mathsf{ep}}(w_0)(w)$ is the set of worlds that are compatible with everything the speaker knows in w_0. Note that the proposition $\mathsf{pizza\_in\_fridge}$ denoted by the consequent clause needs to be pluralized such that it can apply to the maximal sum world denoted by the antecedent.

(7) a. If Peter went shopping, then there is pizza in the fridge.

b. $[\![$if Peter went shopping$]\!]$

$$= \sigma(\lambda w.\mathsf{go\_shopping}(w)(\mathsf{peter}) \wedge R_{\mathsf{ep}}(w_0)(w))$$

c. $[\![$ (7a) $]\!]$

$$= {}^*\mathsf{pizza\_in\_fridge}(\sigma(\lambda w.\mathsf{go\_shopping}(\mathsf{peter})(w) \wedge R_{\mathsf{ep}}(w_0)(w)))$$

[1] This is the standard case for indicative conditionals. Later in section 5.1, we extend our analysis of normal indicative conditionals to subjunctive conditionals, where this restriction will be amended for the subjunctive case.

[2] Since possible worlds are abstract objects by definition we do not want to engage in any discussion regarding the status of 'concrete' sums as opposed to 'abstract' sets (see the discussion of sum individuals vs. sets of individuals in Link 1983 and Landman 1989).

[3] Here and in the following we simplify analyses (eg. by ignoring the internal structure of the clauses and issues like tense, etc.) in order to focus on the main points we want to get across.

What (7c) thus says in effect is that the set of worlds where Peter went shopping (and that are compatible with what the speaker knows) is a subset of the set of worlds where there is pizza in the fridge.

The reason why we assume conditional antecedents to denote maximal pluralities rather than unique possible worlds (as in Stalnaker 1968 and the expository sections of Schlenker 2004) is that we do not subscribe to the view that there is always a unique possible world that satisfies the two requirements in (6) above[4]. In addition to that, we will see below that an analysis in terms of pluralities of possible worlds is more plausible in terms of our assumptions about topic establishment[5].

As we will show below, the crucial aspects of our analysis can also be recast in a Lewis/Kratzer-style approach. This type of approach assumes that *if*-clauses have no meaning of their own, but rather serve to restrict all kinds of quantificational operators (Lewis, 1975; Kratzer, 1986). According to this view, NCs are simply a special case where *if*-clauses restrict a covert epistemic modal operator with universal force, i.e. a covert counterpart of epistemic *must* (Kratzer, 1986). We chose a referential analysis as our point of departure since it allows for a more straightforward description of the parallelism of NCs/BCs and the corresponding types of topicality we argue for. Below we will briefly comment on the compatibility of our analysis with Lewis/Kratzer-style approaches, however.

As already pointed out in Schlenker (2004), the conditionals-as-definite-descriptions analysis has the pleasing consequence that it can straightforwardly be brought in line with the argument that *if*-clauses are *topics* (e.g. Haiman, 1978). One well-known means to mark a DP for topical status is its *left dislocation* to the left periphery of a clause that contains a pronominal element picking up the (individual type) referent of that DP (8). In correspondence to this, left peripheral *if*-clauses have been argued to occur left-dislocated where *then* is a proform picking up the (world type) referent of the *if*-clause (9) (e.g. Comrie, 1986; von Fintel, 1994; Iatridou, 1994; Izvorski, 1996).

(8) [The man my father works with in Boston]$_T$, he's going to tell the police that the traffic expert has set that traffic light on the corner of Murk Street far too low. (Ross, 1967, ex. 6.128a)

(9) [If Peter went shopping]$_T$, then there's pizza in the fridge.

In this paper, we refine this correspondence by distinguishing two types of dislocation that function to mark two distinct types of topics, viz. *aboutness topics* and *relevance topics*. We argue that NCs constitute instances of aboutness topicality while BCs constitute instances of relevance topicality. We give a formal analysis of the two types of topicality that uniformly derives the observed semantic/pragmatic effects in case of dislocated DPs *and if*-clauses.

We will propose to analyze topicality in general by a separate speech act of reference REF. In all investigated cases, the left-dislocated element (a DP/an

[4]See the analysis of counterfactuals in (Lewis, 1973) for arguments that the same issue arises if conditional antecedents are assumed to denote possible worlds that are maximally similar to the world of evaluation w.r.t. compatibility with the truth of the antecedent.

[5]We are grateful to an anonymous reviewer for pointing this out to us.

if-clause) is introduced into the discourse by reference to a suitable representative of this element, e.g. to a maximal sum world for an *if*-clause. Then the speech act indicated by the matrix CP is performed, i.e. the REF act prepares the ground for the interpretation of the speech act associated with the matrix CP. The difference between aboutness and relevance topicality lies in the relation of the two speech acts. In case of aboutness topicality, it is one of predication where the left-dislocated element provides an argument for a predicate derived from the matrix CP denotation. The presence of a corresponding proform (like *then*) will be the crucial trigger for derivation of this predicate. For conditionals, this strategy will result in the usual NC semantics, eventually. In case of relevance topicality, there is no stronger relation between the two acts despite their consecutive performance. Thus, the matrix CP denotation is semantically independent from the left-dislocated element introduced by the REF act, which only establishes a relevance context for the interpretation of the subsequent assertion/question/command/etc. For conditionals, this comes down to a BC reading and, crucially, to an unconditional performance of the consequent speech act.

In Section 2, we will review some previous approaches towards the analysis of biscuit conditionals and point out their shortcomings. Section 3 presents the parallels we are after: two types of topicality correspond to two types of conditionals. Our analysis is developed in Section 4. Section 5 discusses some further issues and questions raised by our proposal while Section 6 concludes the paper. The appendix spells out the formal details of our approach.

2 On Biscuit Conditionals

Biscuit conditionals have been under heavy scrutiny in the last couple of decades. We will briefly review some recent prominent approaches towards analyses of BCs and point out shortcomings in the following.

DeRose and Grandy (1999) analyzed BCs as conditional assertions: while the truth of the consequent does not depend on the truth of the antecedent, the speaker's assertion of the consequent seems to depend on the truth of the antecedent. The speaker only asserts the consequent under the condition that the antecedent is true. This approach is an influential one among a whole family of approaches, which all build on the assumption that the consequent of a BC is (conditionally) asserted and which Siegel (2006) calls *Assertion Theories*.

The problem with this type of account is that it is too weak. Consider the example in (10):

(10) If you don't want to watch the movie, the gardener is the killer.

Note that no matter whether the addressee wants to watch the movie or not, the speaker spoiled it by uttering (10). Hence the speech act in the consequent has actually been performed at the time of the utterance, independently of the truth of the antecedent.

This point can be made even more clearly by using German examples, where there is a clear syntactic difference between NCs and BCs independently of the

presence of the proform *dann* (engl. *then*) (cf. Davison, 1983). In the case of NCs, exemplified in (11), the finite verb either directly follows the *if*-clause or the proform. In the case of BCs, exemplified in (12), some other constituent (usually the grammatical subject of the main clause) intervenes between the *if*-clause and the finite verb.

(11) Wenn Du mich fragst, was ich von Dir denke, (dann) bist Du ein Idiot.
If you me ask what I of you think then are you a idiot

'If you ask me what I think of you, then you are an idiot.'

(12) Wenn Du mich fragst, was ich von Dir denke, Du bist ein Idiot.
If you me ask what I of you think you are a idiot

'If you ask me what I think of you, you are an idiot.'

Accordingly, (11) and (12) unambiguously receive an NC and BC interpretation, respectively[6]. Whereas in (11) the speaker's attitude towards the listener depends on the question whether the listener wants to know the speaker's opinion about him[7], this is not the case for (12), where the speaker unconditionally insults the listener. Again, as in the English example above, this consequential act of insulting has been performed independently of the truth of the antecedent *if*-clause, which only signals when this might be relevant to the listener.

For BCs, DeRose and Grandy argue that the speaker implicates that the consequent of a BC is true, even in cases where the antecedent is false. While this could explain why (10) and (12) have their unconditional effects of spoiling the movie and insulting the listener, respectively, it is not clear how this argument can be extended to speech acts different from assertions. The following examples illustrate such '*biscuit conditional questions/commands*'.

(13) If I may ask a stupid question, did Miles Davis ever play in a combo that was led by Thelonious Monk?

(14) If I may be honest, better call Andreas as soon as possible. (Schwager, 2006, ex. 3a)

As in the assertive case, the speaker poses a question by uttering (13) even if the listener is not inclined to hear stupid questions. Likewise, (14) constitutes a command irrespective of the truth of the antecedent. We hence can conclude that the predictions of the analysis of DeRose and Grandy's do not meet the facts concerning the unconditional performance of the consequent speech act.

The account of Siegel (2006) suffers from a similar problem. Siegel analyses BCs as involving existential quantification over *(presupposed relevant) potential literal acts*. For instance, (2) would be analyzed along the lines of the following paraphrase.

[6] In contrast, the English translation of (12) without *then* is ambiguous between an NC and a BC reading.

[7] E.g. because the speaker considers it highly impolite to ask about this kind of opinion.

(15) In all worlds (that are epistemically accessible from the world of evaluation) where you are hungry, there exists a (presupposed relevant) assertion of 'there is pizza in the fridge'.

Siegel (2006) argues that potential literal acts are the correct objects involved in the analysis of BCs, instead of actually performed speech acts, and puts forth a wealth of arguments to support her analysis. In particular, she aims to show that such *Assertion Theories* do not yield the correct results. In the same spirit, she argues against the *Performative Hypothesis*. Such approaches (represented e.g. by Iatridou 1991) analyze (2) along a paraphrase which makes the performative explicit.

(16) If you are hungry, I say to you that there is pizza in the fridge.

As briefly sketched towards the end of the preceding section, our analysis of BCs comes down to what Siegel (2006) would call an assertion theory. The consequent proposition of the BC is interpreted via a speech act that is actually performed. As we like to emphasize the independence of the exact nature of this speech act (which does not have to be an assertion), we would like to refer to these theories as *Performative Theories* in the following. Rather than what was argued for in DeRose and Grandy (1999), we take it that this speech act is performed unconditionally and that the antecedent only establishes a relevance context. Hence all arguments that Siegel (2006) puts forth against unconditional performative theories constitute potential arguments against our proposal as well. In the following, we will discuss these arguments and show that they do not pose actual problems for our approach.

Siegel (2006) singles out three main predictions that are made by performative theories:

1. BCs assert their consequents and only their consequents,
2. BCs then entail their consequents, and
3. the *if*-clause expresses some sort of condition on the assertability of the consequent clause.

We would like to point out that points (1.) and (2.) of these predictions only apply to BCs with consequents that have assertive force. In other words, speech acts like questions or commands are not captured by these predictions. (3.) only applies to our theory if one views relevance considerations as conditions on speech act performances.

One important example (Siegel, 2006, p. 171, ex. 8), which is meant to argue against performative theories, is the following.

(17) If they ask you how old you are, you're four.

Siegel (2006, p. 171ff) argues that (17) does not entail the proposition expressed by the consequent, i.e. it does not entail that the hearer is four, thus contradicting prediction (2.). We share this judgement. However, in this case one can argue that the consequent clause does not constitute an assertion and hence prediction (2.) cannot be assumed to hold in the first place. An obvious alternative would

be to assume that the consequent constitutes a speech act of commanding. As commands do not commit the speaker to the truth of what is expressed by her orders, prediction (2.) obviously would not follow. Siegel (2006) considers the possibility that (17) might actually involve a command. However, she dismisses this possibility on the grounds that (17) does not behave like an imperative (18a) that could be countered by a listener with (18b), since (18b) is not a felicitous continuation of (17).

(18) a. A: If they ask you how old are you, (I order you to) say you're four.
b. B: No, I won't!

In our view, however, this only shows that (17) provides no accessible antecedent that could license the VP ellipsis in (18b). That by (17) indeed an (indirect) speech act of commanding is performed can be elucidated by a felicitous subsequent refusal to comply that is non-elliptical or one that targets a precondition of the command speech act, e.g. questioning the authority of the speaker. Indeed, (19) and (20) are fine as a reply to (17)[8].

(19) No, I won't say that!

(20) No, I'm old enough, you can't boss me around!

This would also explain why (17) neither entails that the listener is four nor that the speaker believes her to be. After all, the involved speech act is a command, not an assertion and hence the speaker naturally does not present herself as believing the propositional content[9].

Another example that Siegel discusses in order to show that BCs need not entail their consequents is the following (Siegel, 2006, p.177, ex. 19).

(22) If we can believe Gordy, a lot of women want to date racecar drivers.

We share the judgment that (22) does not entail that a lot of women want to date racecar drivers. We would like to argue, however, that (22) is not a BC, but rather

[8]But see footnote 7 on p. 176 of Siegel (2006). Here, it is argued that sometimes it is possible to deny propositions that are only entailed, but not e.g. asserted. Hence, the fact that (19) or (20) are possible responses to (17) does not necessarily show that (17) involves a command. Thanks to an anonymous reviewer for pointing this out to us. We think, however, that it at least shows that (17) *can* be considered to be a command and that Siegel's arguments to dismiss this possibility altogether are not conclusive.

[9]An anonymous reviewer pointed out to us that the responses in (19) and (20) are intuitively responses to the entire complex move and not to the consequent speech act alone. If the consequent speech act actually was a command and if this was the only speech act performed in (17), it should be possible to respond to it with *No, I won't do that*, so the reviewer argues, which is still odd. While we agree that this response is inappropriate, we believe that this is for reasons that are independent of matters that have to do with BCs. Consider the following conversation, which is equally odd.

(21) a. A: And don't forget my instructions: you're four!
b. B: #No, I won't do that!

(21b) cannot be understood to mean that B will not say that he is four, even though the utterance of A clearly involves an order. We tentatively assume that it is highly underspecified what exactly B is ordered to do. He could be instructed to say that he is four, to pretend to be four, to act as if he was four in a particular situation, etc. This underspecification might be the reason that *do*-insertion is not appropriate here, either.

an NC. It is then predicted that the consequent proposition is not entailed unconditionally. First, it seems that inserting *then* in (22), which only appears with NCs, does not change the semantics of this sentence. Furthermore, as pointed out above (cf. ex. 11 and 12), German distinguishes syntactically between BCs and NCs by way of word order: while V2 word order in the consequent clause indicates a BC reading, a consequent clause with the verb in initial position indicates an NC reading. When we translate (22) into German, it becomes clear that it is most naturally realized with a verb initial consequent clause, and hence receives an NC reading.

(23) Wenn man Gordy glauben darf, (dann) wollen viele Frauen mit
If you Gordy believe may (then) want many women with
Rennfahrern ausgehen.
race car drivers date
'If we can believe Gordy, a lot of women want to date racecar drivers.'

(24) ?? Wenn man Gordy glauben darf, viele Frauen wollen mit
If you Gordy believe may many women want with
Rennfahrern ausgehen.
race car drivers date

(23) sounds much more natural than (24) and expresses the speaker's doubt towards the consequent proposition, depending on whether one may believe Gordy. To the extent that (24) with V2 word order in the consequent clause can be uttered felicitously, however, it expresses a speaker commitment to the claim that a lot of women want to date racecar drivers, exactly like predicted by performative theories.

Finally, (Siegel, 2006, p.180, ex. 22) puts forth the following example to argue that BCs do not necessarily entail their consequents.

(25) If you want to hear a big fat lie, George W. and Condi Rice are secretly married.

Siegel notes that the fact that (25) is judged true by speakers '*would be hard to explain within theories that maintain that speakers of BCs are asserting only the overt consequent*' (p. 180). But again, as in the case of (17), the speech act of the consequent clause cannot be a run-of-the-mill assertion since it has been explicitly classified as a lie beforehand, just as in (26).

(26) Let me tell you a big fat lie: George W. and Condi Rice are secretly married.

Hence the speaker is neither representing herself as knowing the embedded propositional content nor does she commit herself to defend the truth of this proposition. Whatever the exact speech act analysis of such a 'false assertion' involves, (25) does not provide a counter-argument to an analysis where BCs involve the performance of a speech act corresponding to the consequent.

Another point concerns Siegel's use of *hereby* as a diagnostic for performative utterances. It is usually assumed that *hereby* can be inserted into performatives. (Siegel, 2006, p.172, ex. 12, 13) presents two examples where the insertion of *hereby* into the consequent clause of a BC makes these sentences infelicitous.

(27) a. # If you need anything else later, my name is hereby James.
b. # If you need anything else later, I hereby say to you that my name is James.

Although (27a) and (27b) are unacceptable, this does not show that the consequents of BCs do not involve the performance of a speech act. The oddness of (27a) can be explained by the fact that *hereby* usually works as a modifier of a performative verb, which (27a) lacks. To illustrate, (28a) is clearly an assertion, but still it is not possible to insert *hereby* as shown in (28b).

(28) a. My name is James.
b. # My name is hereby James.

On the other hand, it is possible to insert *hereby* in a slightly modified version of (27b).

(29) If you need anything else later, I hereby inform you that my name is James.

This may be due to the fact that *inform* indicates a specific performative use, and hence clearly acts as an explicit performative verb, whereas the verb *say* is highly underspecified considering its performative use and may not act as an explicit performative at all. Indeed, *hereby* seems to be licensed in general in the consequents of BCs under the same conditions as it is licensed in stand-alone speech acts. Thus, (27b) rather seems to be the exception and not the rule.

(30) a. (If you have trouble later,) I hereby promise to be there for you.
b. (If I may have your attention,) I hereby declare the exhibition open.

After all, the arguments used by Siegel to argue against the performative theories can finally be used to argue for them. Examples (17) and (25) can be explained in performative theories, if one accepts that the speech act expressed in their consequent is not an assertion, but a command/a 'false assertion' that has been classified as untrue beforehand, respectively. Example (22) seems to rather have an NC reading instead of a BC reading. Finally, it is possible to insert *hereby* in the consequents of BCs hosting explicit performative verbs, which seems to suggest that the associated speech act is actually performed. We conclude that any approach to BCs that does not enforce the performance of the speech act associated with the consequent clause is too weak to capture the facts we discussed above.

Franke (2007, 2009) offers a different approach towards the NC/BC distinction, which we would like to discuss briefly in the following. Franke aims at a purely pragmatic explanation of the difference between NCs and BCs: In contrast to NCs, in the case of BCs antecedent and consequent are epistemically independent in the view of the speaker, i.e. her belief in the truth of the antecedent does not have any influence on her belief in the truth of the consequent. It is thus predicted that as soon as context, background assumptions etc. favor a reading according to which the truth of the antecedent and the truth of the consequent are independent of each other, any given indicative conditional should be interpreted as a BC, and vice versa for the case of NCs. This is not borne out by the facts, however: recall from above that (11) can only be interpreted as an

NC, while (12) can only be interpreted as a BC, in spite of the fact that both antecedent- and consequent-proposition are identical in both cases.

The syntactic structure of the respective sentence thus has a clear influence on whether it is interpreted as an NC or a BC, not pragmatic considerations alone. This is true independently of the context in which it is uttered. Likewise, as already pointed out in the introduction with respect to the English examples (2) and (5), repeated here as (31) and (32), a conditional with a strongly favored BC interpretation inevitably receives an NC interpretation as soon as *then* is added, no matter how implausible this latter interpretation might be.

(31) If you are hungry, there is pizza in the fridge.

(32) # If you are hungry, then there is pizza in the fridge.

In light of these facts, a purely pragmatic account of the difference between NCs and BCs is not tenable[10].

Another proposal we want to mention is Predelli (2009). In his proposal the truth conditions of a BC solely depend on the truth conditions of the matrix clause, i.e. he assumes that the *if*-clause is truth conditionally inert and only modifies the class of contexts in which the matrix sentence can be felicitously uttered. This is evidenced by the widespread intuition (which we share) that a speaker who reacts to an utterance of a BC like (31) by a denial such as *No, that's not true* just denies that there is pizza in the fridge. In other words, she denies the truth of the matrix clause, independently of whether she considers the *if*-clause to be true or false.

Predelli assumes that for each sentence S there is a set of contexts c (where contexts include parameters for agent, world, time, place, addressee, etc.) that satisfy the conditions for '*conversationally generally relevant use*' of S, i.e. where the agent of c utters S at the time and world of c under appropriate conditions[11]. The sole contribution of an *if*-clause in a BC consists in a modification of the conditions of appropriate use for the respective matrix sentence – it maps the set of contexts of conversationally relevant use of S to the subset where the *if*-clause is true.

Of all the accounts towards an explanation of BCs, the one of Predelli is closest to ours in spirit. We also assume that (a) the *if*-clause and the matrix clause are independent in that they constitute different speech acts that are performed in sequence and that (b) there is a conventional meaning associated with BCs that sets them apart from NCs, i.e. that the differences between them cannot be derived from purely pragmatic considerations. What sets our account apart from Predelli's, however, is that he stipulates that the contribution of *if*-clauses in BCs is different from the one in NCs. Our analysis, in contrast, aims for a unified theory of NCs and BCs that accounts for the (in)dependence of the truth of antecedent and consequent as well as for the observed relevance effects. In addition to that, we argue that these semantic and pragmatic effects are not an

[10] As a reviewer pointed out, this does not mean that Franke's approach is in principle unable to deal with the contrasts just mentioned – it would have to be modified, however, such that different syntactic structures play a role insofar as they signal pragmatic distinctions.

[11] How such conditions are to be defined is left open.

isolated phenomenon, but rather are parallel to those exhibited by two different types of topicality. In the following we will therefore take a closer look at two left dislocation constructions that mark these two types of topicality and discuss their parallels to the two types of conditionals afterwards.

3 Two Types of Topics – Two Types of Conditionals

In this section we review work on two left dislocation constructions in German and examine their semantic and pragmatic properties. We argue that each construction marks a distinct type of topicality. We then examine parallels between these two constructions and indicative conditionals in their NC and BC reading. As it turns out, there are striking parallels. Hence we conclude that the *if*-clauses of indicative conditionals are best analyzed as instances of the two types of topicality.

3.1 Two Types of Topics

The examples in (33) and (34) exemplify *German left dislocation* (GLD) and *hanging topic left dislocation* (HTLD), respectively[12]. Note that we translated GLD and HTLD with English constructions that are – quite confusingly – called *topicalization* and *left dislocation*, respectively (cf. Prince, 1998). However, while there may be parallels of the corresponding constructions (cf. Frey, 2005) we do not want to suggest that this match is perfect.

(33) Den Pfarrer, den kann keiner leiden.
The-ACC pastor RP-ACC can nobody like.
'The pastor nobody likes.'

(34) Der/den Pfarrer, keiner kann ihn leiden.
The-NOM/-ACC pastor nobody can him like.
'The pastor, nobody likes him.'

In both constructions a DP occurs at the left periphery of a clause that contains a resumptive element. However, Frey (2004) shows (building on Altmann, 1981) that the following characteristics concerning prosodic integration (P), the resumptive element (R), and binding facts (B) set these two constructions apart.

(P) Prosodic Integration. In case of HTLD, the left peripheral phrase is separated from the rest of the sentence by a short pause. In the case of GLD, there usually is no such pause.

(R) Resumption. GLD requires the presence of a resumptive pronoun which must be a weak *d*-pronoun (such as *der*, *den*, *die*, *das*, etc.). It is preferably realized in the prefield (i.e. in Spec., CP) of the matrix clause. The left peripheral element has to be marked for the same case as the resumptive pronoun.

[12] RP stands for 'resumptive pronoun'.

In the case of HTLD, the resumptive element may occur in the form of a personal pronoun (cf. 34), a weak *d*-pronoun, a strong pronoun like *dieser*, an epithet or a definite description. It can show up either in the prefield or in the middlefield of the clause (cf. 34). The left peripheral element may either be in the nominative or in the same case as the resumptive element (cf. 34).

(B) Binding. GLD allows for binding of a pronoun contained within the left peripheral constituent by a quantifier in the matrix clause. In the case of HTLD, no such binding is possible. The following pair illustrates this contrast:

(35) Seinen$_i$ Vater, den verehrt jeder$_i$.
His-ACC father RP-ACC admires everybody
'Everybody admires his father.'

(36) * Sein(en)$_i$ Vater, jeder$_i$ verehrt ihn.
His(-ACC) father everybody admires him

While the pronoun *seinen (his)* occurring in the left peripheral element can be bound by *jeder (every)* from within the clause in the case of the GLD construction in (35), this is not possible for the HTLD construction in (36).

We note that the HTLD construction imposes much fewer constraints on the relation of the left periphery and the matrix clause and hence the connection between the two is much looser than in the case of GLD constructions (which is also indicated by the prosodic separation).

Concerning semantic and pragmatic effects, Frey (2004) argues that GLD marks *aboutness topicality* in the sense of Reinhart (1981). In this view (which is based on Strawson, 1964) topicality establishes the entity the sentence is about. Reinhart elaborates this idea in suggesting that the sentence topic should serve as an *address* at which the remaining information of the sentence, the *comment*, is stored. In other words, the comment part is argued to predicate over the topic.

Frey (2004) elucidates the aboutness topic-marking effect of GLD by observing that a sentence exhibiting GLD such as (37b) is an appropriate answer to an explicit request for information such as (37a) about the entity denoted by the left peripheral phrase. A sentence exhibiting a GLD construction marking a different entity as aboutness topic yields an incoherent answer in the same context (cf. 37c) despite that fact that it conveys the same information.

(37) a. Any news about the pastor?

b. Der Pfarrer, der hat den Bürgermeister geohrfeigt.
The-NOM pastor RP-NOM has the-ACC mayor slapped.
'The pastor has slapped the mayor.'

c. # Den Bürgermeister, den hat der Pfarrer geohrfeigt.
The-ACC mayor RP-ACC has the-NOM pastor slapped.
'The pastor has slapped the mayor.'

In contrast, HTLD indicates *relevance* topicality. It is an instance of more general relevance topic constructions where a conventionalized expression (e.g. *as for X, ...* or *concerning/regarding X, ...*) is used to indicate that the fact expressed in the subsequent clause is relevant w.r.t. questions regarding X (Roberts, 2012a; Repp, 2011). The following sentence illustrates this.

(38) As for the pastor, the marriage sermon was wonderful.

Here the pastor is introduced as the entity with respect to which the information that the marriage sermon was wonderful is considered relevant. In these more general relevance topic-marking constructions such as (38) the left peripheral constituent is not necessarily picked up by a proform within the matrix clause. Hence, these general relevance topic constructions impose yet fewer syntactic constraints than HTLD on the relation of the left peripheral element and the clause.

To sum up, the difference concerning the connection of the left periphery and the clause in case of GLD vs. HTLD and more general relevance-topic-marking constructions is reflected by their semantic-pragmatic function: while aboutness topicality (marked by GLD) signals that the clause provides direct information about and predicates over the left peripheral entity, relevance topicality (marked by HTLD, *as for*-constructions, etc.) only signals that the information of the clause is relevant w.r.t. some question regarding the left peripheral entity. Before we turn to our formal analysis of these findings, we argue that exactly the same differences can be observed with normal indicative vs. biscuit conditionals.

3.2 Two Types of Conditionals

Let us first take a close look at indicative conditionals in their NC and BC reading and compare these w.r.t. the three just discussed characteristics of left dislocation constructions.

(P) Prosodic Integration. In the case of BCs, the left peripheral *if*-clause is separated from the rest of the sentence by a short pause. In the case of NCs with left peripheral *if*-causes, in contrast, there does not have to be such a clearly audible pause, and if there is one, it tends to be shorter than in the case of BCs (cf. Davison, 1983 and Haegeman, 2003, p. 324, who mentions the same prosodic separation for *premise conditionals* as opposed to *event conditionals*).

(R) Resumption. It has been argued by several authors (eg. Comrie, 1986; Iatridou, 1994; von Fintel, 1994; Izvorski, 1996) that *then* can be regarded as a proform which relates back to the possibilities introduced by the *if*-clause. It can hence be seen as a resumptive element that corresponds to the weak *d*-pronoun in the case of the GLD constructions. Crucially, as we remarked before, the presence of *then* enforces an NC reading while a BC reading is only available in the absence of *then* as illustrated in (2) vs. (5), repeated below[13] .

[13]Let us add a note of caution at this point: as observed by (Schlenker, 2004), *then* can also

(39) If you are hungry, there is pizza in the fridge.

(40) #If you are hungry, then there is pizza in the fridge.

(B) Binding. While binding into the *if*-clause seems to be possible in the case of NCs, it is not in the case of BCs as the following example[14] illustrates (cf. Iatridou, 1991; Haegeman, 2003).

(41) Wenn man sie$_i$ gut pflegt, dann blüht [jede Orchidee]$_i$
If one it well groom then blossoms every orchid
mehrmals im Jahr.
several times in the year
'Every orchid blossoms several times a year, if you groom it well.'

(42) * Wenn Du etwas über sie$_i$ wissen willst, [jede
if you something about it to know want every
Orchidee]$_i$ blüht mehrmals im Jahr.
orchid blossoms several times in the year

Comparing these characteristics to those separating GLD and HTLD from the previous section it is evident that NCs containing *then* strongly resemble GLD while BCs parallel relevance topic-marking construction such as HTLD. The following summary serves to illustrate this.

	GLD	HTLD	NC	BC
(P) prosodically integrated	+	−	+	−
(R) resumptive pronoun present	+	+/−	+/−	−
(B) binding from matrix possible	+	−	+	−

In fact, it has often been observed that there is a strong syntactic similarity between NCs (and subjunctive conditionals) with left-peripheral *if*-clauses and correlative constructions, which '*involve a free relative clause adjoined to the matrix clause and co-indexed with a proform inside it*' (Bhatt and Pancheva, 2006; see Alonso-Ovalle 2009, Rawlins 2013 for additional discussion). Bittner (2001), for instance, cites the following example from Warlpiri[15], which she credits to Hale (1976).

receive focal stress if the *if*-clause contains a focal element as well. Interestingly, the same pattern has been observed to occur in sentences exemplifying GLD (see Frey, 2004, ch. 5.1, p. 12ff). Here the resumptive pronoun can receive focal stress if the left-dislocated DP is either focal itself or contains a focal element. Following Frey's analysis of such sentences, we assume that in both cases the position occupied by the DP/the *if*-clause is not a topic position, but rather a contrast position. Since we are only interested in topicality in this paper, we will not discuss these cases any further.

[14]We use German examples here, since the corresponding English ones are uniformly deviant due to *Weak Crossover*, a constraint, which – roughly speaking – prevents bound pronouns from occurring to the left of their binders, and which is not in effect in German.

[15]In the glosses, the non-obvious abbreviations are as follows: ST = same topic, TOP = topic, NPST = non-past.

(43) Maliki-rli kaji-ngki yarlki-rni nyuntu ngula-ju kapi-rna
[dog-ERG ST-3SG.2SG bite-NPST you] DEM-TOP FUT-1SG.3SG
luwa-rni ngajulu-rlu
shoot-NPST me-ERG

a. 'As for the dog that bites you, I'll shoot it.'
b. 'If a dog bites you, then I'll shoot it.'

As she notes, (43) introduces a topical referent via the dependent clause at the left periphery and is ambiguous between two readings. In (43a), the dependent clause refers to an individual while in (43b) it refers to a '*prominent possibility*'. The correlated proform in the matrix is the topic-oriented anaphoric demonstrative *ngula-ju*. This example illustrates nicely the parallels we are after: *if*-clauses resemble correlative constructions, which in turn introduce some type of topic. Bittner suggests that both readings of (43) should essentially have the same representation, up to logical type, and develops a formal approach along these lines. Our approach is in the same spirit with regards to this unification.

Given the different topic-marking function of GLD and HTLD, we conclude that the left peripheral *if*-clauses of NCs and BCs constitute instances of aboutness topicality and relevance topicality, respectively. In both cases the *if*-clause serves as the topic, while the matrix clause supplies the comment (cf. Haiman, 1978; von Fintel, 1994; Bittner, 2001)[16]. Indeed, it is easily possible to find equivalent paraphrases for BCs in terms of relevance topic-marking constructions:

(44) If you are hungry, there is pizza in the fridge.

(45) As for the possibility that you are hungry, there is pizza in the fridge.

In this example the semantic and pragmatic effects are completely parallel: the antecedent/relevance topic establishes the conditions for the relevance of the matrix speech act and the proposition expressed by the matrix clause is asserted unconditionally.

4 A Unified Analysis

In this section we first derive the semantic and pragmatic contributions of GLD and relevance topic-marking construction such as HTLD in the nominal domain by extending the approach to *aboutness topicality* by Endriss (2009) to *relevance topicality*. We then apply the very same analysis to the two types of conditionals introduced above.

4.1 Topics as Speech Acts

Endriss (2009) argues that aboutness topics should be interpreted via a separate speech act of *topic establishment* REF_X resembling an act of *referring* (Searle, 1969) or *frame setting* (Jacobs, 1984; Lambrecht, 1994). This act formally establishes a

[16]See especially von Fintel, 1994, ch. 3, where conditionals are treated in parallel to topic constructions in the individual domain and to left-dislocated DPs in particular.

new topic by introducing a novel discourse referent X for the topic-marked constituent. The remainder of the sentence (i.e. the comment) is then understood as another speech act in which this discourse referent X may serve as an argument as part of its propositional content. This is in fact an implementation of the storage address metaphor of Reinhart (1981): the information of the comment is 'stored' at the 'address' X.

Crucially, it is assumed that the REF_X act is interpreted before this originating speech act (for the moment we will restrict ourselves to assertions). Hence an assertion of a proposition structured into topic and comment is interpreted as indicated roughly in the schema in (46).

(46) $\mathsf{ASSERT}(\langle \varphi_{\text{topic}}, \psi_{\text{comment}} \rangle) \rightsquigarrow \mathsf{REF}_X(\varphi_{\text{topic}}) \;\&\; \mathsf{ASSERT}(\psi_{\text{comment}}(X))$

This approach is reminiscent of the two steps in *categorical judgements* introduced by the philosopher Franz Brentano. A categorical judgement is performed by '*the act of recognition of that which is to be made the subject* [i.e. the topic in our terminology], *and the other, the act of affirming or denying what is expressed by the predicate about the subject*' (Kuroda, 1972, p.154). Such a judgement corresponds straightforwardly to what a sentence with a topic expresses. A *thetic judgement*, on the other hand, is made in one single step and used to report the perception of a situation. Such a judgement corresponds most naturally to an antitopic/topicless sentence.

Let us illustrate this approach with GLD as prototypical means to mark aboutness topicality, which overtly exhibits the topic-comment structure. While the left-dislocated DP serves as the topical argument to the REF act, the matrix-CP supplies the comment proposition. The resumptive pronoun (such as a *d*-pronoun in the specifier of the matrix-CP) serves as the crucial link between the two. Its precise function is to derive a predicate from the matrix-CP denotation, which is eventually applied to the topical discourse referent X introduced in the REF act. In a GLD sentence such as (33), repeated here as (47a), the left-dislocated constituent and the matrix clause are thus interpreted as in (47b,c).

(47) a. [Den Pfarrer]$_T$, den kann keiner leiden.
The-ACC pastor RP-ACC can nobody like.
'The pastor nobody likes.'

b. $[\![\text{Den Pfarrer}]\!] = \lambda w.\iota x[\mathsf{pastor}(w)(x)]$

c. $[\![\text{den kann keiner leiden}]\!] = \lambda x \lambda w.\neg\exists y[\mathsf{person}(w)(y) \wedge \mathsf{like}(w)(x)(y)]$

The left-dislocated DP denotes (the individual concept that selects) the unique pastor in each world. The matrix-CP denotes an individual predicate, that – when given an argument d – results in the proposition that d is not liked by anyone.

As pointed out above, the actual analysis proceeds on the speech act level. We will restrict our attention to assertions for the time being, but as we will discuss later, GLD can be used with other speech acts as well. First, the REF_X act serves to establish the topic by introduction of a novel discourse referent X. Subsequently, an assertion speech act commits the speaker to the truth of the proposition stating that the comment holds of X. In general, we take the actual effects of the speech acts to be as follows:

(48) $\mathsf{ASSERT}\big(w, p_{\langle s,t\rangle}\big) \equiv$ the speaker commits herself to the truth of p in w

(49) $\mathsf{REF}_X\ \big(w, d_{\langle s,\sigma\rangle}\big) \equiv$ the speaker draws the listener's attention to $d(w)$

An assertion $\mathsf{ASSERT}\,(w, p)$ of a proposition p w.r.t. a world w essentially commits the speaker to the truth of p in w. In the default case, that world will be the actual world w_0 of the utterance situation. Crucially, as we will see later, there may be deviations from this default in case of conditionals.

The REF act also comes with two arguments. The first is again a world argument w.r.t. which the second argument is evaluated. The second argument represents the entity to be introduced as topic. In the case of (47b) above, this second argument is an individual concept (i.e. it is of type $\langle s, e\rangle$), which is applied to the world of evaluation, resulting in an object of individual type e to be introduced as topic. In general we want to be flexible w.r.t. the type of topic introduced such that σ in (49) ranges over types such as e,$\langle\langle e, t\rangle, t\rangle$, etc., for instance in case of *quantificational topics* as discussed briefly below. In this paper we will for the most part restrict ourselves again to the most perspicuous case of individuals, i.e. $\sigma = e$, when it comes to nominal topics. The suggested topic interpretation hence leads to the following refinement of schema (46).

(50) $\mathsf{ASSERT}(\langle \varphi_{\text{topic}}, \psi_{\text{comment}}\rangle)$
$\rightsquigarrow\ \mathsf{REF}_X(w_0, \varphi_{\text{topic}})\ \&\ \mathsf{ASSERT}(w_0, \psi_{\text{comment}}(X))$

For (47a), we have φ_{topic} =(47b) and ψ_{comment} =(47c). Therefore, the final representation of the involved speech act sequence is as follows, where we use & to indicate consecutive performance of speech acts.

(51) $\mathsf{REF}_X(w_0, \lambda w.\iota x[\mathsf{pastor}(w)(x)])$
$\&\ \mathsf{ASSERT}(w_0, \lambda w.\neg\exists y[\mathsf{person}(w)(y) \wedge \mathsf{like}(w)(X)(y)])$

In uttering (47a), the speaker first introduces the pastor ($X = \iota x[\mathsf{pastor}(w_0)(x)]$) as the topic. Subsequently, she asserts that nobody likes the just introduced pastor, i.e. she commits herself to the truth of $\neg\exists z[\mathsf{person}(w_0)(z) \wedge \mathsf{like}(w_0)(X)(z)$.

To get a clearer idea of the effects of the involved speech acts, it is useful to take a closer look at their truth-conditional update effects w.r.t. to a shared body of information, the *common ground (CG)*. Given a common ground c as a current information state within a discourse, we model the effects of the REF_X act on c as an introduction of a novel discourse referent X, which refers to the topical entity, here $\iota x[\mathsf{pastor}(w_0)(x)]$. In other words, the CG update after performance of the REF_X act in (51) is given as

$$c\ +\ \exists X\ +\ X = \iota x[\mathsf{pastor}(w_0)(x)].$$

The subsequent update with an assertion needs to be restricted to the worlds of evaluation of ASSERT. Only w.r.t. to these worlds does the speaker commit herself to the truth of the asserted proposition. In case of (51), the world of evaluation is w_0 and since the CG contains only live alternatives to w_0, the restriction is vacuous and hence without effect. This will be different for conditionals, where the speaker commits herself to the truth of the consequent in the worlds denoted

by the antecedent. For (51), the final CG update looks as follows.

$$c \ + \ \exists X \ + \ X = \iota x[\mathsf{pastor}(w_0)(x)] + \lambda w.\neg\exists y[\mathsf{person}(w)(y) \wedge \mathsf{like}(w)(X)(y)$$

In order to focus on the main claims of our approach, we will mostly work with representations on the speech act level, such as (51). How such representations are derived from the underlying syntactic structure and what their precise effects in terms of common ground update are is explained in detail in the appendix.

Note that we do not observe any truth-conditional difference between an assertion of (47a) and an assertion of (52a), a thetic/topicless sentence[17].

(52) a. Keiner kann den Pfarrer leiden.
nobody can the-ACC pastor like.
'Nobody likes the pastor.'

b. $\mathsf{ASSERT}(w_0, \lambda w.\neg\exists y[\mathsf{person}(w)(y) \wedge \mathsf{like}(w)(\iota x[\mathsf{pastor}(w)(x)])(y)])$

This is different if the topical constituent is an indefinite in which case we may find truth-conditional differences. For instance, (53a) (ex. 13 from Endriss and Hinterwimmer 2010), where the DP *Einen Song von Bob Dylan (some song of Bob Dylan)* occurs left-dislocated in a GLD construction, is unambiguous. The only reading it receives is a wide scope reading for the indefinite, saying that there is one song of Bob Dylan such that everybody knows this song. On the other hand, (53b), where the indefinite is simply fronted, is ambiguous between this wide scope reading and a narrow scope reading of the indefinite.

(53) a. [Einen Song von Bob Dylan]$_T$, den kennt jeder.
Some-ACC song of Bob Dylan, RP-ACC knows everybody.
'Everybody knows some song of Bob Dylan.'

b. Einen Song von Bob Dylan kennt jeder.
Some-ACC song of Bob Dylan knows everybody.
'Everybody knows a song of Bob Dylan.'

To analyze these findings, Endriss (2009) proposes a quantificational treatment of indefinites as generalized quantifiers, such that the REF act of topic establishment refers to a suitable set-type representative of the GQ. With this analysis, a truth conditional effect of topic marking is predicted: the topic takes widest (possibly island-free) scope. In (53a), for instance, the speaker introduces some song of Bob Dylan as topic with a subsequent assertion that everybody knows this just introduced song. We will not go into any further detail about quantificational topics and the derivations of the involved topic-comment structures at this point, but refer the reader to (Endriss, 2009) instead.

Now that we sketched an analysis of aboutness topicality, let us turn to relevance topicality and its corresponding constructions. Recall that the crucial difference between GLD and general relevance topic-marking constructions lies in

[17]However, we do predict a pragmatic difference. In (47c), the REF act of topic introduction may fail in its own right, for instance if the corresponding individual does not exist. We take this to be a fact towards an explanation of the often discussed observation that non-referring definite descriptions produce some kind of *squeamish* feeling in a listener if they are topical while they do not if they are non-topical (cf. Ebert and Ebert, 2010, and the literature discussed therein).

the presence of a proform in the matrix clause: while GLD poses strict requirements (in terms of form, case, etc.) on the proform, in general relevance topic-marking constructions such a proform may even be completely absent (cf. 38, repeated as 54a). If we want to adapt the mechanism laid out above to this case, the matrix-CP will not denote a predication about the topical entity due to the absence of a proform. Instead, the matrix-CP is interpreted as the proposition (54b).

(54) a. [As for the pastor]$_T$, the marriage sermon was wonderful.

b. $[\![$the marriage sermon was wonderful$]\!]$
$= \lambda w.\mathsf{wonderful}(w)(\iota y[\mathsf{marriage\_sermon}(w)(y)])$

c. $\mathsf{REF}_X(w_0, \lambda w.\iota x[\mathsf{pastor}(w)(x)])$
$\&\ \mathsf{ASSERT}(w_0, \lambda w.\mathsf{wonderful}(w)(\iota y[\mathsf{marriage\_sermon}(w)(y)]))$

The final representation in (54c) hence tells us that in uttering (54a) the speaker introduces the pastor as the topic and asserts that the marriage sermon was wonderful.

In the case of HTLD constructions such as (34, repeated here as 55a), we proceed analogously and view the matrix-CP as an independent proposition. Therefore we treat any present proform not as creating a predicate that eventually takes the discourse referent X as argument as in the GLD case, but as an anaphoric element that needs to be resolved. For (55a) this analysis hence yields (55b) as the interpretation of the matrix-CP and eventually (55c) as the final representation.

(55) a. [Der/den Pfarrer]$_T$, keiner kann ihn leiden.
The-NOM/-ACC pastor nobody can him like.
'The pastor nobody likes.'

b. $[\![$keiner kann ihn leiden$]\!] = \lambda w.\neg\exists y[\mathsf{person}(w)(y) \wedge \mathsf{like}(w)(z)(y)]$

c. $\mathsf{REF}_X(w_0, \lambda w.\iota x[\mathsf{pastor}(w)(x)])$
$\&\ \mathsf{ASSERT}(w_0, \lambda w.\neg\exists y[\mathsf{person}(w)(y) \wedge \mathsf{like}(w)(z)(y)])$

Here the proform *ihn (him)* ends up as a free variable z that must be resolved to some salient individual in the context (cf. Roberts, 2004). Since the immediately preceding context consists of the introduction of the pastor via the REF act, this just introduced individual is maximally salient and therefore the only possible antecedent for the resolution.

At this point it is crucial to note that the only connection between the topic and the comment lies in the consecutive performance of the corresponding speech acts. Here the issue of relevance comes into play: using standard assumptions on discourse cohesion, an assertion is only felicitous if it is relevant to the preceding discourse. In fact, this is what we observe: the assertion is interpreted as providing further information about the pastor. We will elaborate on this relevance effect in a later section.

To sum up, we see topicality as introducing a separate speech act of topic establishment that is interpreted prior to the original speech act of the utterance. In the case of aboutness topicality (instantiated by GLD) the relation of topic and

comment is one of predication: a required proform ensures that the topical entity ends up as an argument within the comment. In case of relevance topicality (instantiated by HTLD and more general relevance topic-marking constructions) the comment is interpreted as an independent proposition. The cohesion between the REF speech act of topic introduction and the original speech act of the utterance is ensured by the requirement of relevance.

In the following section, we will apply this analysis of topicality to conditionals.

4.2 *if*-clauses as Topics

As mentioned in Section 1, we assume the antecedents of normal indicative conditionals to be (semantically plural) definite descriptions of possible worlds (Stalnaker, 1968; Schein, 2001; Schlenker, 2004). In this approach an *if*-clause *if* P is interpreted as the maximal sum of possible worlds where P is true and which are compatible with what the speaker knows in the actual world[18] w_0. To make things more perspicuous, we use the following abbreviation to denote this maximal sum object, given a proposition p:

(56) For a given proposition p and a world w' we define $\mathbf{M}_{w'}(p)$ as follows:

$$\mathbf{M}_{w'}(p) := \sigma(\lambda w.p(w) \wedge R_{\mathsf{ep}}(w')(w))$$

In this view, the *if*-clause in (1, repeated here as 57a) thus denotes the object in (57b): the maximal sum of possible worlds where Peter went shopping that is compatible with what the speaker knows in the actual world. The proposition denoted by the consequent (57c) is then evaluated w.r.t. the denotation of the *if*-clause. In this approach, (57a) thus denotes (57d), i.e. the result of applying the pluralization of the consequent proposition to the maximal sum of worlds denoted by the *if*-clause.

(57) a. If Peter went shopping, then there is pizza in the fridge.

b. $\mathbf{M}_{w_0}(\lambda w.\mathsf{go\_shopping}(w)(\mathsf{peter}))$
$= \sigma(\lambda w.\mathsf{go\_shopping}(w)(\mathsf{peter}) \wedge R_{\mathsf{ep}}(w_0)(w))$

c. $\lambda w.\mathsf{pizza\_in\_fridge}(w)$

d. $^{*}\mathsf{pizza\_in\_fridge}(\mathbf{M}_{w_0}(\lambda w.\mathsf{go\_shopping}(w)(\mathsf{peter})))$

Based on our observations concerning the parallels between NCs and the GLD construction from the preceding section we assume that the *if*-clause in (57a) is actually interpreted as an aboutness topic. Therefore, according to our analysis, a REF act of topic establishment introduces a discourse referent X for the maximal sum of worlds denoted by the *if*-clause, and it is then asserted that the predicate of worlds denoted by the consequent holds of all atomic parts of X.

As mentioned in the preceding section, *then* has been argued to be a proform of possible worlds (cf. e.g. Iatridou, 1994; Izvorski, 1996; Bhatt and Pancheva,

[18] Again, this restriction only holds for normal indicative conditionals and not for subjunctive conditionals (see footnote 1).

2006). We assume that it supplies the topical discourse referent in exactly the same way as the resumptive pronoun (like the *d*-pronoun *den* in 47a) in the case of GLD. Here, however, this world-type discourse referent is not an integral argument of the consequent proposition, but serves as the world at which it is evaluated[19].

Since our analysis makes the involved speech acts explicit, the world of evaluation for the consequent shows up as the first argument to the speech act, in the form of the maximal sum of worlds denoted by the topicalized antecedent. Our topic-based analysis of (57a) hence comes out as (59) rather than as (57d) (recall that the consequent proposition needs to be pluralized such that it can be applied to the antecedent).

(59) $\mathsf{REF}_X\,(w_0, \lambda w'.\mathbf{M}_{w'}(\lambda w.\mathsf{go\_shopping}(w)(\mathsf{peter})))$
$\& \; \mathsf{ASSERT}(X, \lambda w.\mathsf{pizza\_in\_fridge}(w))$

The speaker first introduces the (maximal sum of) worlds where Peter went shopping as the topic of conversation. Then she asserts that pizza is in the fridge in all these worlds, i.e. she commits herself to the truth of the proposition pizza_in_fridge in all these worlds. In effect, the assertion comes down to the speaker's commitment to the truth of

(60) $^*\mathsf{pizza\_in\_fridge}\,(\mathbf{M}_{w_0}(\lambda w.\mathsf{go\_shopping}(w)(\mathsf{peter})))\,.$

Again we do not see any semantic effect of the topical status of the *if*-clause, similar to the individual case in (47) vs. (52).

As for BCs, recall that they do not allow the proform *then* in their consequent. Therefore, as in the individual case of relevance topicality (54), the topical discourse referent cannot be supplied to the subsequent speech act. Instead, the proposition is again treated as independent, i.e. as being true in the actual world. (61b) illustrates the result for the BC in (2), repeated as (61a)[20].

(61) a. [If you are hungry]$_T$, there is pizza in the fridge.

[19]Concerning the question of whether *then* is base-generated in its left-peripheral surface position (which we take to be the specifier of CP) or somewhere deeper in the clause, the following observation is relevant. In independent main clauses where it picks up the (maximal sum of) worlds introduced by a preceding *if*-clause, *then* can occur not only in left-peripheral position, but also after the subject and the main verb (58a). In embedded clauses which are not the consequents of conditionals this is even the most natural position (58b).

(58) a. A: What will Charles do if Mary comes to the party?
B: (Then,) he will (then) write an angry email to the host on the next day.

b. A: What will Charles do if Mary comes to the party?
B: He said that (then,) he will (then) write an angry letter to the host on the next day.

We thus assume that *then* is base-generated as an adjunct in a position above the base position of the subject and the finite verb (which move to their respective surface positions for purely syntactic reasons such as the checking of agreement features, case assignment/checking etc.), where it serves as the highest argument of the respective proposition. From there, it can – or, in the case of conditional antecedents, must – move to its left-peripheral surface position, parallel to the case of D-pronouns in GLD.

[20]Note that the pluralization of the consequent proposition is not strictly necessary here, but applied for the sake of consistency.

b. $\mathsf{REF}_X\,(w_0, \lambda w'.\mathbf{M}_{w'}(\lambda w.\mathsf{hungry}(w)(\mathsf{listener})))$
$\&\ \mathsf{ASSERT}(w_0, \lambda w.\mathsf{pizza\_in\_fridge}(w))$

Here the speaker first introduces the maximal sum of possible worlds in which the listener is hungry as topic and then she asserts that there is pizza in the fridge *in the actual world*. In effect, this comes down to the speaker's commitment to the truth of

(62) $^*\mathsf{pizza\_in\_fridge}(w_0)$.

The analysis in terms of general properties of relevance topic-marking constructions thus gives us precisely what we observe for BCs: the consequent is asserted unconditionally as being true in the *actual* world, while the antecedent serves as a means to make it relevant.

Our analysis also explains the restrictions on the occurrence of *then*. In fact, if *then* is inserted into the consequent of a conditional with a clear BC reading, it receives an NC reading as in the following variant of (61a).

(63) a. [If you are hungry]$_T$, then there is pizza in the fridge.
b. $\mathsf{REF}_X\,(w_0, \lambda w'.\mathbf{M}_{w'}(\lambda w.\mathsf{hungry}(w)(\mathsf{listener})))$
$\&\ \mathsf{ASSERT}(X, \lambda w.\mathsf{pizza\_in\_fridge}(w))$

This is exactly what we predict. In our analysis, the presence of *then* is responsible for an evaluation of the consequent clause w.r.t. the topical worlds. The final representation in (63b) thus comes out as an act of topic introduction for all the possible worlds where the listener is hungry (that are compatible with what is known about the actual world) with a subsequent assertion that there is pizza in the fridge in all these worlds. As often (though not always) in cases of BC readings turning into NC readings, such an analysis yields a quite implausible meaning, in this case suggesting a causal connection between the listener's hunger and the pizza's occurrence in the fridge.

At this point, we remind the reader that *then* is not obligatory for an NC reading as (4), repeated here as (64a), illustrates.

(64) a. If Peter went shopping, there is pizza in the fridge.
b. If Peter went shopping, then there is pizza in the fridge.
c. Keiner kann den Pfarrer leiden.
nobody can the-ACC pastor like.
'Nobody likes the pastor.'
d. [Den Pfarrer]$_T$, den kann keiner leiden.
The-ACC pastor RP-ACC can nobody like.
'The pastor nobody likes.'

This is again in line with the nominal case. We take it that the difference between (64a) and (64b) is the same as between (64c) and (64d). While (64b,d) exhibit overtly aboutness topic-marked *if*-clauses/DPs, (64a,c) contain no overtly marked aboutness topic. This leaves open the possibility that the *if*-clause/DP is focal, or that the respective sentences are thetic/topicless. Accordingly, (64) would receive a standard conditional interpretation along the lines of (57d). In

our speech act based analysis such a non-topical construal would come out as the plain assertion in (65).

(65) $\textsf{ASSERT}\,(\mathbf{M}_{w_0}(\lambda w.\textsf{go\_shopping}(w)(\textsf{peter})), \lambda w.\textsf{pizza\_in\_fridge}(w))$

As we pointed out above, there is no traceable difference between the topical and the non-topical case and thus (57a) and (64) both come out in their NC meaning.

Essentially we predict conditionals without *then* to be ambiguous between a BC and an NC reading in English (in German, matters are different since also word order in the consequent serves to mark the distinction; see Section 2 above), depending on the topic status of the *if*-clause. The fact that the *if*-clause and the main clause tend to be separated by a longer and thus more clearly audible pause in BCs as compared to NCs in both German and English can plausibly be seen as indicating that the matrix clause is to be treated as an independent assertion. In addition, the word order findings in the matrix clauses of BCs in German might also be taken to indicate assertive force, given that assertive force is usually ascribed to V2 word order in German in general (Gärtner, 2000; Wechsler, 1991).

4.3 Topicality and Relevance

In the literature on topicality, its discursive effect is often said to be captured by raising the question *What about X?*, where X is the topical entity. We implement this idea by assuming that the REF act of topic establishment introduces the question *What properties are true of X?* as the current *question under discussion* (QUD, Roberts, 2012b). Thus, we assume that a REF act together with a subsequent speech act generates a coherent discourse only if the subsequent act partially answers the question raised by the REF act.

To illustrate, let us look at an example where the connection between topic and comment may not be evident at first sight.

(66) As for Peter, Mary does not take people seriously who pretend to love every single note that Miles Davis ever recorded.

The relevance topic construction in (66) is understood as providing information about Peter and as communicating as non-proffered information the background assumption that Peter is one of those people who pretend to love every single note that Miles Davis ever recorded. In other words, the act of topic establishment with the subsequent assertion in (66) is coherent if the proposition that Peter pretends to love every single note that Miles Davis ever recorded is already part of the common ground or if it can be easily accommodated. In this case the asserted proposition entails a partial answer to the question asking for Peter's properties.

In the case of aboutness topicality/GLD, the coherence requirement for the felicitous subsequent performance of an act of topic establishment and assertion is fulfilled straightforwardly. Since the topical entity X serves as an argument in the asserted proposition, the asserted proposition necessarily provides a partial answer to the question asking for the properties of X.

Considering the NC case, the requirement of relevance is straightforwardly fulfilled in the same way. Since the topical entity is not an individual, but a maxi-

mal sum of possible worlds, we take its properties to be the propositions that are true in all of its atomic parts. The question about its properties is thus the question asking for all the propositions that are supersets of the set of atoms of the maximal sum of worlds. In the example above, this question would (roughly) be the question *What is true in case Peter went shopping?*. As in the case of individual-denoting aboutness topics, the asserted proposition necessarily provides a partial answer to that question, since the topic serves as an argument to a predicate in the assertion.

Let us finally turn to BCs. Taking (61) as an example, recall that all the worlds that are part of the topic(al sum of worlds) are compatible with everything that is known in the actual world. Hence each proposition that is known to be true in the actual world is also true in those worlds. By asserting the proposition that there is pizza in the fridge in the actual world, the speaker presents herself as knowing that it is true in the actual world, and the listener consequently takes it to be true in the topical worlds as well. The asserted proposition thus automatically provides a partial answer to the question *What is true in case the listener is hungry?* that is established as the current QUD by the REF act. Furthermore, the relevance of this assertion is self-evident under the plausible assumption that the speaker intends to be cooperative.

4.4 Binding

Having presented our basic analysis of NCs vs. BCs we now turn to an explanation of the binding facts. Recall that binding into the dislocated element is possible in the case of GLD and NCs, but impossible in the case of HTLDs and BCs. Again we strive for a uniform explanation of these facts and we will do this along the lines of (Ebert and Endriss, 2007)[21]. In the following we will briefly review this proposal and apply it to the case of NCs vs. BCs. For reasons of perspicuity, we will do this only informally in this section and defer the formal details to the appendix again.

We start with the case of GLD and aboutness topicality. Ebert and Endriss (2007) argue that cases like (35), repeated as (67) exemplify *functional topics*. In these cases, the speaker introduces a *function* as the entitiy the sentence is about (the function paraphrasable as *being-father-of* in the following example).

(67) Seinen$_i$ Vater, den verehrt jeder$_i$.
His-ACC father RP-ACC admires everybody.
'Everybody admires his father.'

Hence the correct analysis must treat the left-dislocated phrase as a function that is introduced as the aboutness topic of the sentence via the REF act. Informally speaking, it should yield a representation that states that the speaker introduces a function of *being-father-of* as the topic with a subsequent assertion that everybody admires whoever is assigned to him by this function.

[21] The reader is referred to this reference for further details on issues we can only superficially touch in the present paper.

In line with this, Ebert and Endriss (2007) argue further that dislocated constituents with bound pronouns do not take narrow scope w.r.t. the binding matrix quantifier (as one may assume at first glance) but *functional wide scope*, which can be truth-conditionally distinguished from genuine narrow scope in case of dislocated quantificational phrases. If the analysis proceeds along the just mentioned informal paraphrase with the REF act preceding the assertion, this scope behavior is ensured.

In case of (67) the dislocated definite denotes an intensional function of type $\langle s, \langle e, e\rangle\rangle$. The denotation of *seinen Vater (his father)* in (68a) takes an individual y and returns the individual that satisfies the $\mathsf{father\_of}(y)$ predicate. The resumptive pronoun correspondingly is of the same functional type $\langle s, \langle e, e\rangle\rangle$ and ensures combination of the function with the matrix verb. As in the non-functional cases in the preceding section, the resumptive element creates a predicate that picks up the topical discourse referent (noted here as F to indicate its functional character) as an argument (68b).

(68) a. $[\![\text{seinen Vater}]\!] = \lambda w \lambda y.\iota x[\mathsf{father\_of}(w)(y)(x)]$

b. $[\![\text{den verehrt jeder}]\!] = \lambda w.\forall y[\mathsf{person}(w)(y) \rightarrow \mathsf{admire}(w)(F(w)(y))(y)]$

Given this derivation of the left peripheral topical constituent and the comment matrix-CP, the same interpretation principle as in the non-functional case applies. The topic is introduced in a separate REF speech act via a novel discourse referent F, followed by an assertion of the matrix-CP proposition containing the topical discourse referent as argument – only that this time the topic and the corresponding discourse referent F are of functional type. The result is as follows.

(69) $\mathsf{REF}_F(w_0, \lambda w \lambda y.\iota x[\mathsf{father\_of}(w)(y)(x)])$
$\quad \& \ \mathsf{ASSERT}(w_0, \lambda w.\forall y[\mathsf{person}(w)(y) \rightarrow \mathsf{admire}(w)(F(w)(y))(y)])$

Here the speaker introduces the *being-father-of* function as the entity the sentence is about and asserts that everybody admires the individual that is assigned to him by this function. This is precisely what (67) expresses.

We can extend this analysis of functional aboutness topicality straightforwardly to cases of relevance topicality as in the non-functional case above. Again the only difference to the aboutness case is the interpretation of the proform (if present) in the matrix-CP comment. As in the non-functional case, any proform is treated as anaphoric element that needs to be resolved. Therefore, the matrix-CP of the HTLD example in (36), repeated here as (70a) is again interpreted as an independent proposition (70b).

(70) a. *Sein(en)$_i$ Vater, jeder$_i$ verehrt ihn.
His(-ACC) father everybody admires him.

b. $[\![\text{jeder verehrt ihn}]\!] = \lambda w.\forall y[\mathsf{person}(w)(y) \rightarrow \mathsf{admire}(w)(z)(y)]$

c. $\mathsf{REF}_F(w_0, \lambda w \lambda y.\iota x[\mathsf{father\_of}(w)(y)(x)])$
$\quad \& \ \mathsf{ASSERT}(w_0, \lambda w.\forall y[\mathsf{person}(w)(y) \rightarrow \mathsf{admire}(w)(z)(y)])$

The resulting interpretation in (70c) can thus be paraphrased as follows: first, the function from individuals into their fathers is established as the topic and then

it is asserted that everybody admires some salient individual. Since it is hard to find a context where this is coherent, (70a) is odd.

As in the non-functional case, the analyses for NCs and BCs run entirely parallel. Since the dislocated *if*-clause contains a pronoun, it denotes a function from individuals into worlds, i.e. it is of type $\langle e, s\rangle$. The proform *dann (then)* again serves to create a predicate that picks up the topical entity, i.e. this function. For the NC in (41), repeated as (71a), the final representation states the topic introduction of a function that assigns to each individual the (maximal sum of) worlds where it is well groomed. It is then asserted that for every orchid it is true in the worlds assigned to it by this function that it blossoms several times in a year. In effect, the speaker commits herself to the truth of (71b) (subsequent to the topic introduction of that function; see the appendix for further details on the derivation). This is as desired.

(71) a. Wenn man sie$_i$ gut pflegt, dann blüht [jede Orchidee]$_i$
if one it well groom then blossoms every orchid
mehrmals im Jahr.
several times in the year
'Every orchid blossoms several times a year, if you groom it well.'

b. $\forall y\big[\mathsf{orchid}(y) \rightarrow$
$^{*}\mathsf{blossom\_several\_times\_in\_year}\big(\mathbf{M}_{w_0}(\lambda w.\mathsf{well\_groomed}(w)(y))\big)(y)\big]$

In the case of BCs such as (42), repeated as (72a), the matrix clause does not denote a predicate but a stand-alone proposition that is interpreted w.r.t. the actual world by default. Hence, effectively this comes down to a speaker's commitment to the truth of (72b) subsequent to the topic introduction of the function that assigns every individual the worlds where the listener wants to know something about this individual.

(72) a. *Wenn Du etwas über sie$_i$ wissen willst, [jede Orchidee]$_i$
if you something about it to know want every orchid
blüht mehrmals im Jahr.
blossoms several times in the year

b. $\forall y[\mathsf{orchid}(y) \rightarrow \mathsf{blossom\_several\_times\_in\_year}(w_0)(y)])$

At this point the relevance requirement is hard to satisfy. After introduction of that function, the subsequent assertion (*Every orchid blossoms several time in the year*) is required to be relevant w.r.t. to the former function, i.e. to partially answer a question about its general properties. As it is difficult to think of a context where this is the case, the sentence as a whole is odd.

4.5 Lewis/Kratzer-style Approaches

In this section we show how the important aspects of our analysis can also be brought in line with Lewis/Kratzer-style approaches to conditionals. According to these proposals (e.g. Kratzer, 1986), the antecedent of an indicative conditional serves as the restrictor of an overt or covert quantificational operator. For

instance, (73) without any overt adverb of quantification or modal, would be interpreted as (74) with a covert necessity operator, thus saying that all situations where Peter went shopping are situations where pizza is in the fridge.

(73) If Peter went shopping, then there is pizza in the fridge.

(74) must[Peter went shopping][pizza is in the fridge]

First, let us consider the proposal that conditional antecedents denote a universal generalized quantifier over possible worlds (i.e. those worlds in which the antecedent proposition is true and which are compatible with the speaker's knowledge in the world of evaluation, cf. Gillies, 2010; Nolan, 2003) as follows.

(75) $[\![\textit{if}\ p]\!] = \lambda q_{s,t}.\forall w[(p(w) \wedge R_{\mathsf{ep}}(w_0)(w)) \rightarrow q(w)]$

If we adopt this view, we arrive at our proposal with only one further step. The reason for this lies in the treatment of topicalized quantificational DPs in Endriss (2009) on which we built our proposal. Endriss (2009) proposes that all quantificational DP topics start out as generalized quantifiers which need to be coerced into one of their minimal witness sets during topic interpretation. For instance, in topic positions, the DPs *a dog*, *three dogs*, and *every dog* would denote a set of exactly one dog, a set of exactly three dogs, and the set of all dogs, respectively, for the purpose of topic interpretation[22]. It is this set that serves as the argument to the REF act of topic introduction.

Transferring this proposal from the individual-type domain to the world-domain, an *if*-clause such as *if you're hungry* in its interpretation as universal quantifier over possible worlds would be subject to the same coercion into the set of all worlds (compatible with the speaker's knowledge in the world of evaluation) where the listener is hungry. From there, we can carry out our program as described above, i.e. apply pluralization and maximization (via $\mathbf{M}_w$) to this set of worlds.

The second proposal to compare ours with is Kratzer (1986), according to which *if* has no meaning proper but only serves to indicate that the clause it heads is interpreted as the restrictor of an overt or covert operator. While the truth conditions of indicative conditionals are basically the same as those assumed by an analysis which takes *if*-clauses to be universal quantifiers over possible worlds, they come about in different ways. On Kratzer's view it is not the complementizer *if* which provides the universal quantification, but a covert epistemic operator with universal force, i.e. a covert counterpart of epistemic *must*. In contrast, the *if*-clause itself denotes just a situation/world-predicate. In and of itself, this is not a major problem, if we assume that the covert epistemic operator forms a constituent with the *if*-clause. What is topicalized in both NCs and in BCs is the object denoted by the combination of the covert operator and the conditional antecedent, i.e. a universal quantifier over epistemically accessible worlds. At this point then everything works as discussed above.

[22] A downward monotonic generalized quantifier would hence be coerced into the empty set. This fact plays a key role in the explanation of the observation that such GQ denoting DPs do not occur marked for topicality across the world's languages (see Endriss, 2009, for further detail).

However, cases such as (76) (first discussed by Lewis, 1975), which originally motivated Kratzer's analysis, are not so straightforward to handle in our approach. In theses cases the *if*-clause seems to restrict an adverbial quantifier.

(76) a. If Peter goes shopping, (then) he usually takes Mary with him.
b. If a philosopher admires Grice, (then) he usually admires Austin as well.

Intuitively, these sentences express quantification over situations of Peter shopping/cases of a philosopher admiring Grice. Here the respective *if*-clause seems to provide a situation predicate that is interpreted in the restrictor of the overt adverbial quantifier[23]. As the optional presence of *then* in the main clause shows, this does not preclude the *if*-clause from functioning as an aboutness topic.

We thus have to assume that it is not the combination of the *if*-clause and a covert operator that is topicalized, but rather the *if*-clause on its own, with the situation predicate it denotes functioning as the aboutness topic. Hence the crucial issue is the analysis of the quantificational adverb and its combination with the *if*-clause denotation. At this point, we recur to Ebert and Hinterwimmer (2010), which is compatible with the assumptions in the present paper. One of the key assumptions there is that adverbial quantifiers combine with their arguments in reverse order, seen from the perspective of determiner quantification. In other words, they combine with their nuclear scope first (provided by the main clause), after having been raised at LF to a position from which they c-command the entire main clause. Afterwards they apply to the situation predicate provided by the *if*-clause.

This in turn makes it possible to apply our proposal. For a conditional such as (76a) with *then* indicating the topic status of the antecedent, the *if*-clause situation predicate is treated as a topic and introduced as such via the REF act. The situation predicate *Peter takes Mary with him* corresponding to the consequent without the adverb serves as the first, and hence nuclear scope argument of the adverb. The proform *then* again creates a predicate such that the topic is supplied as the second, and hence restrictor argument of the adverb.

5 Further Issues

In this section we discuss some further issues and extensions of our proposal. These include subjunctive conditionals, consequent speech acts different from assertions, right dislocated *if*-clauses and nested conditionals.

[23] In Hinterwimmer (to appear) reasons are given for assuming a more complicated structure for such sentences where a conditional clause in its entirety is interpreted in the nuclear scope of the respective adverbial quantifier, while the restrictor is provided on the basis of information structure and/or context. A sentence such as (76a) would thus (very roughly) be interpreted as saying that most situations s that are potential situations of Peter shopping are such that all modal counterparts of s where Peter goes shopping can be extended to modal counterparts where Peter takes Mary with him. A detailed discussion of that analysis would take us beyond the scope of the present paper, though.

5.1 Subjunctive Conditionals and Topicality

So far, we have only discussed cases where the antecedents of indicative conditionals function as (either aboutness- or relevance-) topics. In this section we turn to subjunctive conditionals[24]. Concerning aboutness topicality, there is strong empirical evidence that it is compatible with subjunctive *if*-clauses in the form of subjunctive conditionals containing *then*:

(77) If Eric Dolphy had not died in 1964, then he would have become one of the leading figures of avant-garde jazz.

And indeed, there is nothing in our analysis that would lead one to expect any incompatibility: a sentence such as (77) can be analyzed analogously to the cases where the antecedents of indicative conditionals function as aboutness topics. Simplifying somewhat, the only difference between subjunctive and indicative conditionals is that by using a subjunctive instead of an indicative conditional the speaker signals that the antecedent proposition might be incompatible with what is known about the world of evaluation. This triggers the implicature that she does not consider the world where the antecedent proposition is true (and that is closest to the world of evaluation) to be a live option for the world of evaluation itself, see (Stalnaker, 1968). Concerning relevance topicality, in contrast, matters are more difficult. It is often assumed that there are no subjunctive BCs (see Iatridou, 1991; DeRose and Grandy, 1999; Declerck and Reed, 2001). Swanson (2013) argues, however, that examples such as the third sentence in (78) provide counterexamples to this claim:

(78) I want to vacation in a posh hotel in London. We would have tea every afternoon. If we were so inclined, there would be biscuits on the sideboard. (slightly modified[25] version of Swanson, 2013, p. 638, his ex. (1))

Swanson points out that by (loosely) translating the example to German, where the above mentioned word order facts distinguish between NCs and BCs, we get clear evidence for its status as a BC:

(79) Ich möchte in einem Nobelhotel in London Urlaub machen. Wir
I want in a posh hotel in London holiday to go. We
würden jeden Nachmittag Tee trinken. Wenn uns danach wäre, Kekse
would every afternoon tea drink. If we for it were, biscuits
wären auf dem Nachttisch.
would be on the nightstand.

(Swanson, 2013, p. 642, his ex. (1')[26])

[24] The term *subjunctive* is not particularly felicitous, since at least in English (in contrast to German and many other languages), there is no real subjunctive morphology present in the kind of conditionals under discussion. The only common alternative term *counterfactual* is just about as problematic, however, since there are cases where a conditional of the kind under discussion can be used felicitously in spite of the fact that the speaker clearly does not believe the antecedent proposition to be false in the world of evaluation (see Bennett, 2003 and the references cited therein for further discussion).

[25] In Swanson's example, the *if*-clause occurs at the right periphery.

[26] According to our intuitions, the conditional in this German example is slightly odd and im-

At the same time, however, the subjunctive version of (2), repeated here as (80), does not have a BC-reading: (81) can only be understood as claiming that the closest (counterfactual) world where the addressee is hungry is one where there is pizza in the fridge, i.e. the consequent proposition is felt to be causally related to the antecedent proposition.

(80) If you are hungry, there is pizza in the fridge.

(81) If you were hungry, there would be pizza in the fridge.

Interestingly, the German translation of (81) in (82) *does* have a BC reading, but only if the subjunctive morphology on the verb receives a non-counterfactual interpretation: The speaker neither indicates that she believes the addressee to be not hungry, nor that there is no pizza in the fridge in the actual world.

(82) Wenn Du hungrig wärst, es wäre Pizza im Kühlschrank.
If you hungry were, it would be pizza in the fridge.

Instead, the effect that is achieved by choosing subjunctive over indicative-marking is one of *hedging*. In (82) the speaker exercises particular caution both with respect to the *truth* of the antecedent proposition as well as the *relevance* of the consequent proposition.

Note also that in the following past tense variant, the subjunctive in the antecedent presumably receives its standard counterfactual interpretation (since the speaker can be assumed to know whether she was hungry or not), while the subjunctive in the consequent indicates hedging again:

(83) Wenn ich hungrig gewesen wäre, es wäre Pizza im Kühlschrank
If I hungry had been, it would pizza in the fridge
gewesen.
have been.
'If I had been hungry, there would have been pizza in the fridge.'

Concerning this hedging use of subjunctive morphology in (82) and (83), we note that this phenomenon is not tied to conditionals in German, but can also be observed in stand-alone assertions such as B's reply in (84), where B in no way indicates that she does not believe there to be pizza in the refrigerator. Rather, what is conveyed by subjunctive morphology is that she is not sure whether her assertion is really relevant as a reply to A's statement that he is hungry, i.e. whether A is really interested in pizza as a means to appease his appetite.

(84) A: Ich habe Hunger.
I hunger have
'I'm hungry.'
B: Ich hätte Pizza im Kühlschrank.
I had-SUB pizza in the fridge

proves considerably when the consequent clause starts with an expletive.

(*) Wenn uns danach wäre, es wären Kekse auf dem Nachttisch.
If we for it were, it would be biscuits on the nightstand.

While this general hedging use of subjunctive morphology in German is surely an interesting topic in its own right, it is not directly relevant for the issues that are our main concern in this paper. We will therefore not aim at an explanation for such hedging uses and take it as given that subjunctive morphology may indicate hedging in German.

Our next task is then to explain why (79) seems to receive a standard counterfactual interpretation. We would like to suggest the following: In a BC, the consequent standardly functions as an independent assertion, i.e. the consequent proposition is held to be true in the actual world of evaluation. This, however, is precluded if the subjunctive marking on the verb receives its standard interpretation, indicating that the speaker does not believe in the truth of the proposition in the actual world of evaluation. At this point, there are two ways out.

1. the subjunctive marking is interpreted differently, namely as merely indicating hedging with respect to the relevance of the proposition for the hearer. This is what happens in (82) and (83).

2. the context supplies another possible world which is compatible with a counterfactual interpretation of the subjunctive. This happens in (79), where the context makes available a world whose fictional character is compatible with a counterfactual interpretation of the subjunctive and which hence serves to evaluate the consequent proposition.

Therefore, we assume the interpretation of the *if*-clause in (79) to be relativized with respect to the fictional world w_f introduced by the context where the speaker vacations in a posh hotel in London. Formally, this means that the REF and the ASSERT act are applied to the fictional world w_f instead of w_0 as world argument. The analysis proceeds along the following lines[27].

(85) $\mathsf{REF}_X(w_f, \lambda w'.\mathbf{M}_{w'}(\lambda w.\mathsf{we\_feel\_inclined\_to\_eat\_biscuits}(w))$
$\quad \& \ \mathsf{ASSERT}(w_f, {}^*\lambda w.\mathsf{there\_are\_biscuits\_on\_the\_sideboard}(w))$

First, the speaker introduces the worlds

(86) $X = \mathbf{M}_{w_f}(\lambda w.\mathsf{we\_feel\_inclined\_to\_eat\_biscuits}(w))$

where the speaker and the addressee feel inclined to eat biscuits that are epistemic alternatives to the fictional world w_f, and then she asserts that there are biscuits on the sideboard in w_f. In addition, the relevance condition demands this latter assertion to provide a partial answer to a QUD such as *What's true in X?*. Concerning English, basically the same reasoning applies[28]. However, opposed to German, an alternative hedging interpretation for the subjunctive

[27] As before, we ignore clause internal structure.

[28] Basically the same reasoning applies to the past subjunctive version of the example in (78) above, the only difference being that the relevant fictional world is now one that differs from the world of evaluation insofar as the speaker and some other person have vacationed in a posh hotel in London during some contextually supplied past interval.

> I wish we had decided to vacation in a posh hotel in London. We would have had tea every afternoon. If we had been so inclined, there would have been biscuits on the sideboard. (slightly modified version of Swanson, 2013, p. 638, his ex. (2))

morphology in the consequent is not available. Therefore, we expect to find a 'subjunctive biscuit' interpretation for cases such as (78), where the context supplies an additional possible world. If such a world is not available contextually, we expect to find a normal subjunctive conditional meaning as in the case of (81).

5.2 Other Consequent Speech Acts

In our analysis of conditionals, we focused on assertive speech acts, although we saw above (cf. section 2) that BCs can well be associated with other speech acts, as well. Not only BCs, but also NCs can be the objects of non-assertive speech acts. We will show in this subsection that our approach is equipped to work with speech acts other than assertions such as questions or commands, associated with BCs as well as with NCs.

Let us have a look at example (87) from (Isaacs and Rawlins, 2008), where an *if*-clause precedes a yes-no-question.

(87) If Alfonso comes to the party, will Joanna leave?

The most straightforward extension of our analysis to such cases would yield an act of topic introduction which is followed by a stand-alone question. While an analysis along these lines resembles a BC analysis and looks like an instance of relevance topicality, there are various reasons to doubt that (87) actually is a BC. First of all, treating the question in (87) as an independent question, i.e. as asking for the truth of the proposition *Joanna will leave* in the *actual world* does not seem to be correct: the speaker only asks for the truth of that proposition in the (closest) possible world where Alfonso comes to the party (which, for all the speaker knows, may, but need not be identical to the actual world) (see Isaacs and Rawlins, 2008 for relevant discussion). Put differently, if the listener answers *yes*, she did not say something wrong in a situation where Alfonso does not show up and Joanna does not leave, but only in a situation where Alfonso shows up and Joanna does not leave.

Secondly, a careful consideration of the structural factors that helped us to distinguish BCs from NCs and relevance topic-marking constructions such as HTLD from aboutness topic-marking constructions such as GLD likewise shows that (87) patterns with NCs and GLD, not with BCs and HTLD.

For a first diagnosis, we note that *then* and its German counterpart *dann* can in principle be inserted into the question consequent without any semantic effect[29]. Note that while in the examples under consideration *then* (and its German counterpart *dann*) might as well be understood as a temporal adverbial with the rough meaning 'immediately after', we can also construe examples which do not allow for such an interpretation of *then*. In a sentence such as *If Alfonso is going to*

In a first step the maximal plurality of worlds (that are epistemic alternatives to the fictional world w_f) is introduced in which the speaker and the addressee felt inclined to eat biscuits at some contextually salient past interval during which they vacationed in a posh hotel in London. Then it is asserted that there were biscuits on the sideboard in w_f at that salient past interval.

[29] It seems that *then* cannot be in clause-initial position, however. A plausible reason is that in questions it is impossible to insert an element that does not bear a +*wh*-feature (and thus agrees with the question operator in C) into the specifier of CP. Therefore, the specifier of CP is blocked as a landing site for *then*, and therefore *then* has to remain in its clause-internal base position.

go to the party tomorrow, will he then buy a gift for the host today?, it clearly cannot be understood as a temporal adverbial, thus showing that the kind of *then* that can occur in NCs with asserted main clauses can occur in conditional questions as well[30].

(88) a. If Alfonso comes to the party, will Joanna leave?
b. ?If Alfonso comes to the party, will Joanna leave then?

(89) a. Wenn Alfons zur Party kommt, wird Joanna gehen?
If Alfonso to the party comes will Joanna go
b. Wenn Alfons zur Party kommt, wird Joanna dann gehen?
If Alfonso to the party comes will Joanna then go

Interestingly, while GLD is compatible not only with assertions, but also with questions in German, the correlative proform may not occur in its usual clause-initial (with respect to the main clause) position, but only in clause-internal position[31]:

(90) Den Pfarrer, hast Du den gestern geohrfeigt?
The-ACC pastor, have you RP-ACC yesterday slapped in the face
'Did you slap the pastor in the face yesterday?'

Concerning binding, (91) also shows that the questions embedded in conditional sentences pattern with GLD and NCs, not with HTLD and BCs[32]:

(91) Wenn er$_i$ eine gute Predigt gehalten hat, trinkt dann jeder$_i$ Pfarrer
f he a good sermon given has, drinks then every pastor
seinen Lieblingswein?
his favorite wine
'Does every pastor drink his favorite wine if he has delivered a good sermon?'

Taken together, these facts strongly suggest that in conditional question sentences such as (87) the *if*-clause functions as an aboutness topic, not as a relevance topic, and that accordingly the question is posed from the view of the possible world denoted by the *if*-clause. In other words, in the case of a yes-no-question like in (87), what is asked for is not the truth of the respective proposition in the actual word, but its truth in the worlds denoted by the *if*-clause.

Concerning the concrete technical implementation of this idea, it is in principle compatible with a variety of theories about question denotations, be it the one of (Karttunen, 1977), according to which a question denotes the set of propositions that are its true answers, or the partition-semantics of (Groenendijk and

[30]In this paper, we do not attempt to answer the question of whether temporal and conditional *then* and its German counterpart *dann* are two distinct items or whether they can be derived from a more basic abstract meaning.

[31]Presumably this is for the reason detailed in footnote 29. This position is not completely excluded in assertions involving GLD as well, but leads to slightly degraded results for most speakers, in contrast to (90).

[32]Again, we switch to German because of the absence of WCO effects.

Stokhof, 1984). Let us adopt the latter for concreteness sake, such that the denotation of the consequent question in (87) comes out as the partition of worlds in (92a). If we assume the question speech act construal in (92b), our analysis of *if*-clauses as aboutness topics gives us the representation in (92c) for the meaning of (87):

(92) a. $[\![\text{will Joanna leave}]\!] = \lambda w \lambda w'.\mathsf{leave}(w)(\mathsf{joanna}) = \mathsf{leave}(w')(\mathsf{joanna})$

b. $\mathsf{QUEST}\left(w, q_{\langle s,\langle s,t\rangle\rangle}\right) \equiv$ the speaker wants to know the truth of $q(w)$
i.e. she wants to know whether $w_0 \in q(w)$.

c. $\mathsf{REF}_X(w_0, \lambda w'.\mathbf{M}_{w'}(\lambda w.\mathsf{come\_to\_party}(w)(\mathsf{alfonso})))$
$\&\ \mathsf{QUEST}(X, \lambda w \lambda w'.{}^*\mathsf{leave}(w)(\mathsf{joanna}) = {}^*\mathsf{leave}(w')(\mathsf{joanna}))$

Thus, (87) receives an interpretation according to which the speaker introduces the possible worlds in which Alfonso comes to the party (which are most similar to the actual world among those worlds where this is true) and subsequently asks for the truth of *Will Joanna leave?* in those worlds. Effectively, the speaker thus wants to know whether

$${}^*\mathsf{leave}(w_0)(\mathsf{joanna}) = {}^*\mathsf{leave}\left(\mathbf{M}_{w_0}(\lambda w.\mathsf{come\_to\_party}(w)(\mathsf{alfonso}))\right)(\mathsf{joanna})$$

Relevance topicality is in principle compatible with questions, too, as the felicity of the example in (93) shows.

(93) As for the pastor, how was the marriage sermon?

This of course raises the question whether we can find genuine '*biscuit conditional questions*', i.e. sentences where the respective question is not asked with respect to the world denoted by the *if*-clause, but with respect to the actual world. A sentence that seems to fit the bill is (13), repeated here:

(94) If I may ask a stupid question, did Miles Davis ever play in a combo that was led by Thelonious Monk?

Intuitively, by uttering (94) the speaker is not just asking for the truth of the proposition *Miles Davis played in a combo led by Thelonious Monk* in the maximal plurality of worlds where she may ask a stupid question, but she performs this question unconditionally in the actual world. That (94) is indeed a case of a genuine 'BC question' is evidenced by the fact, that insertion of *then/dann* results in utterly strange questions.

(95) a. #If I may ask a stupid question, did Miles Davis then ever play in a combo that was led by Thelonious Monk?

b. #Wenn ich mal eine ganz dumme Frage stellen darf, hat Miles Davis dann jemals in einer Combo gespielt, die von Thelonious Monk geleitet wurde?
If I once a entirely stupid question pose may, has Miles Davis then ever in a combo played, which of Thelonious Monk led was

In fact, the interpretation of (94) seems to be such that the question is understood as a very stupid question of a person that is not informed about Jazz music or

Miles Davis. That this is so comes about as a relevance effect of the speaker referring to the possible world introduced by the *if*-clause and posing the question about Miles Davis afterwards.

Concerning other speech acts such as commands, we note that they are embeddable under *if*-clauses, as well, and suggest that such sentences can instantiate aboutness and relevance topicality, i.e. there are NC and BC commands, just like there exist NC and BC assertions and questions. The following example constitutes an NC command.

(96) If you have already finished your emails, tell me about your new paper.

(96) allows for the insertion of *then* without any perceivable change in meaning and its intuitive interpretation suggests a tighter connection between the meaning of the *if*-clause and the meaning of the embedded imperative than mere relevance: the listener is only required to tell the speaker about her new paper if she has indeed finished her emails.

As expected, one can also find examples for '*biscuit conditional commands*' as (14) from Schwager (2006), repeated below, shows.

(97) If I may be honest, better call Andreas as soon as possible.

As we have seen, there exist BCs and NCs with other speech acts than assertions such as questions and commands. We assume that these conditionals can be handled in parallel to the assertion cases that we spelt out above, but leave a detailed analysis of conditional commands and questions in terms of aboutness and relevance topicality for a future occasion.

5.3 Right Peripheral *if*-clauses

If-clauses quite naturally also occur at the right periphery of the consequent clause for both NCs and BCs as the following variations of (1) and (2) show.

(98) There is pizza in the fridge, if Peter went shopping.

(99) There is pizza in the fridge, if you are hungry.

Interestingly, there is a pair of right peripheral constructions that seems to pattern with GLD and HTLD, respectively, namely *German Right Dislocation* (GRD) and *afterthought* (AT). In both constructions a DP follows the right edge of a clause that contains a coreferent proform. (100) illustrates GRD, while (101) illustrates AT (slightly modified from Averintseva-Klisch, 2006).

(100) Ich mag sie$_i$ nicht, die Serena$_i$.
I like her not the Serena

(101) Und dann passierte es, dieser schreckliche Autounfall.
And then happened it, this terrible traffic accident

Concerning a semantic and pragmatic analysis, (Averintseva-Klisch, 2006, p. 23) suggests that GRD 'mark[s] the introduction of the DP as the discourse topic referent for the following discourse segment' and that AT has the function of resolving an unclear pronominal reference in the clause. Averintseva-Klisch (2006)

also investigates syntactic and semantic differences of these two constructions and notes among others that

(P) Prosodic Integration. '[G]RD is prosodically integrated into its host sentence [...], whereas AT builds a prosodic unit (optionally divided by a pause from the clause) [...] of its own.'

(Averintseva-Klisch, 2006, p. 16)

(R) Resumption. 'Strict morphological agreement (in case, gender and number) between the clause-internal proform and the DP is obligatory for [G]RD and optional for AT.'

(Averintseva-Klisch, 2006, p. 17)

Obviously, (P) and (R) pattern with the corresponding points of the characteristics of the left dislocation constructions (thus hinting at a parallel of GLD and GRD as well as HTLD and AT). Now it is very tempting to assume a parallel not only between GRD and GLD, but also between conditionals with left-dislocated *if*-clauses and ones with right-peripheral *if*-clauses interpreted as NCs such as (98), with the former instantiating GLD, and the latter GRD.

While an in-depth investigation and comparison of these constructions is beyond the scope of this paper, we would like to point to one possible problem for the assumption that GRD and NCs with right-peripheral *if*-clauses instantiate the same kind of topical construction. Right-peripheral *if*-clauses may well be focal (see Johnston, 1994 for discussion) and thus they can replace the *wh*-pronoun in an answer to a *wh*-question.This is impossible for right-dislocated DPs, however[33].

(102) A: Unter welchen Umständen wirst Du Peter ohrfeigen?
Under which circumstances will you Peter slap in the face

'Under what circumstances will you slap Peter in the face?'

B: Ich werde ihn ohrfeigen, wenn er versucht, mich zu
I will him slap-in-the-face if he tries me to
KÜSSEN.
kiss

'I will slap him in the face if he tries to kiss me.'

(103) A: Wen hast Du gestern geohrfeigt?
Who-ACC have you yesterday slapped in the face

'Who did you slap in the face yesterday?'

B: *Ich habe ihn geohrfeigt, den PETER.
I have him slapped in the face, the-ACC Peter.

Concerning the question of whether BCs with right-adjoined *if*-clauses are a special form of AT, at first sight it makes sense to relate the resolution of unclear pronominal reference to what can plausibly be assumed to be the communicative purpose of uttering (99) instead of the version with the left-peripheral *if*-clause:

[33] In the examples (102) and (103), capitals indicate focal stress.

namely, to add a reason for why an assertion was made by indicating the condition under which it is relevant. This again makes it very attractive to treat ATs and BCs with right-adjoined *if*-clauses as instances of the same kind of topic construction.

But again, to decide on the question whether AT and BCs with right-adjoined *if*-clauses have parallel functions and pattern alike in all respects, more work needs to be done. For the moment, we want to tentatively suggest that there is a parallel between these two constructions in the same way as there is a parallel between GRD and NCs with right-peripheral *if*-clauses. But we leave that as a topic for future work.

5.4 Nested Conditionals as Nested Topics

At this point we would like to comment on the fact that *if*-clauses can be stacked as the following example from (Bhatt and Pancheva, 2006, p. 674, ex. (115)) illustrates. Here we cite the bracketing from (Bhatt and Pancheva, 2006), but change the subscripts to *NC* and *BC* according to our terminology. In later examples we resort to a different bracketing which shows nesting of conditionals that is more in line with our analysis. Bhatt and Pancheva (2006) observe that in case of this type of stacking, ordering restrictions apply such that in sentence-final *if*-clauses, those belonging to NCs occur before those of BCs .

(104) a. Peter takes his dog out [$_{NC}$ if it rains] [$_{BC}$ if you want to know].
b. *Peter takes his dog out [$_{BC}$ if you want to know] [$_{NC}$ if it rains].

Example (105) shows that we observe the same restriction with left-dislocated *if*-clauses. Interestingly, a parallel restriction holds for the nominal domain. It is possible to have GLD constructions nested inside relevance topic (RT) constructions, but not vice versa, as (106) illustrates.

(105) a. [$_{BC}$ If you want to know, [$_{NC}$ if it rains, then Peter takes his dog out]].
b. *[$_{NC}$ If it rains, [$_{BC}$ if you want to know, Peter takes his dog out]].

(106) a. [$_{RT}$ Was den Pfarrer betrifft, [$_{GLD}$ der Peter, der kann ihn nicht
What the pastor concerns, the Peter, RP can him not
leiden]].
like.
'As for the pastor, Peter does not like him.'
b. *[$_{GLD}$ Der Peter, [$_{RT}$ was den Pfarrer betrifft, der kann ihn nicht
The Peter, what the pastor concerns, RP can him not
leiden]].
like.

Note that we also find nestings of BCs within BCs and NCs within NCs[34].

(107) a. [$_{BC}$ If you don't mind me pointing this out, [$_{BC}$ there's work to be done, if you aren't busy]] .

[34]Thanks to an anonymous reviewer who brought up the issue of nested BCs and who provided us with example (107a).

b. [$_{\text{NC}}$ If it rains, ($^{?}$then) [$_{\text{NC}}$ Peter takes his dog out, if he feels well]].

We conclude that this is again an issue of topicality: topics can occur nested or, more precisely, aboutness topics can occur nested inside relevance topics. Intuitively it makes sense that this should be the case. Relevance topics provide a frame of interpretation w.r.t. which the following material is to be interpreted. It seems reasonable that this can be exploited repeatedly to create a sequence of such frames of interpretation. In the case of aboutness topicality, however, we find a much tighter connection of the topic and the material in the matrix clause. As argued above, the relation between the two is one of predication, i.e. the topic ultimately supplies an argument to the comment. Hence, on an intuitive level, it again makes sense that there should be no relevance topic intervening between an aboutness topic and its comment.

Our analysis allows for nested topics. For instance, for (105a) we arrive at the following representation. It is interpreted as a speech act sequence of 1. a topic introduction of (the plurality of) all worlds where the listener 'wants to know', 2. another topic introduction of (the plurality of) all worlds where it rains, and 3. the subsequent assertion that commits the speaker to the truth of the proposition *Peter takes his dog out* in these latter worlds.

(108) $\mathsf{REF}_X(w_0, \lambda w'.\mathbf{M}_{w'}(\lambda w.\mathsf{want\_to\_know}(w)(\mathsf{listener})))$
$\quad \& \ \mathsf{REF}_Y(w_0, \lambda w'.\mathbf{M}_{w'}(\lambda w.\mathsf{it\_rains}(w)))$
$\quad \& \ \mathsf{ASSERT}(Y, \lambda w.\mathsf{take\_out\_dog}(w)(\mathsf{peter}))$

So while our approach assigns reasonable interpretations to nested cases of topicality as above, it currently does not predict the intuitively reasonable ordering restriction. We have to leave this refinement of our approach for future work.

6 Conclusion

We proposed a unified explanation of the semantic and pragmatic effects of normal indicative conditionals (NCs) and biscuit conditionals (BCs) based on the idea that *if*-clauses function as topics. To this end, we put forth a uniform analysis of two types of topicality (*aboutness* vs. *relevance*) which we argued to be underlying the two types of conditionals. The common aspect of these two types of topicality is that a speech act of topic establishment precedes the actual speech act of the utterance, where the cohesion of the two is ensured by a general conversational principle of relevance. The crucial difference lies in the relationship between topic and comment. While it is one of predication in case of *aboutness* topicality where the topic functions as argument, in case of *relevance* topicality the comment is independent from the topic and related to it by the relevance requirement alone. This explains the pragmatic effects we encounter with BCs and nominal relevance topic constructions.

Our approach explains why the presence of the apodosis marker *then* inevitably leads to an NC reading. *Then* is analyzed as a proform that signals aboutness topicality, which is parallel to the nominal case, where the presence

of a resumptive proform results in an aboutness topicality reading for a left-dislocated constituent. Due to the speech act analysis we propose, our approach is capable of dealing with the fact that conditionals exhibit not only assertive speech acts, but also questions and commands and that there exist normal conditional questions and commands as well as biscuit conditional questions and commands. We also investigated the applicability of our approach to subjunctive biscuit conditionals, conditionals with right-dislocated *if*-clauses and nested conditionals.

Appendix

In this appendix we provide the formal details for the compositional derivation and interpretation of the representations we have put forth in the main text to illustrate the basic ideas of our analysis.

Structured Meanings and Interpretation. Our logical representation language will be the higher-order typed logic with lambda that is standard to contemporary formal semantics. One non-standard addition that we make use of are *structured meanings* $\langle \varphi, \psi \rangle$ along the lines of (Krifka, 1992; von Stechow, 1989) as a means to keep track of two meaning contributions in parallel, in particular of the meaning contributions of topic-marked expressions.

Structured meanings will be interpreted as pairs of independent denotations, for which we introduce a dotted type.

(109) **Types:**

a. e, s, t are basic types (for individuals, worlds, and truth-values, resp.)

b. if σ and τ are types, $\langle \sigma, \tau \rangle$ is a type.

c. if σ and τ are types, $(\sigma \bullet \tau)$ is a type.

Sticking to convention, $\langle \sigma, \tau \rangle$ will be the complex types of functions from denotations of type σ to denotations of type τ, while $(\sigma \bullet \tau)$ will be the type of pairs with denotations of type σ and denotations of type τ in the second component.

(110) **Model:**

A **model** $M = \langle D, W, I \rangle$ is a triple consisting of a set of individuals D, a set of possible Worlds W and an interpretation function I.

(111) **Domains:**

a. $D_e = D$, $D_s = W$, $D_t = \{0, 1\}$ are the domains for the basic types

b. $D_{\langle \sigma, \tau \rangle} = {D_\tau}^{D_\sigma}$ is the domain of σ-τ-functions

c. $D_{(\sigma \bullet \tau)} = D_\sigma \times D_\tau$ is the domain of σ-τ-pairs

The interpretation $[\![\cdot]\!]^{w,g}$ of the logical connectives/quantifiers/lambda-abstraction/function application in the model with respect to a world w and a variable assignment g is the usual. The only extension in our proposal concerns structured

meanings, which are interpreted as pairs of denotations of the corresponding domain[35].

(112) **Interpretation:**

for every constant C of type σ: $[\![C]\!]^{w,g} = I(C) \in D_\sigma$

for every variable v of type σ: $[\![v]\!]^{w,g} = g(v) \in D_\sigma$

a. $[\![\varphi_{\langle\sigma,\tau\rangle}(\psi_\tau)]\!]^{w,g} = [\![\varphi]\!]^{w,g}([\![\psi]\!]^{w,g})$

b. $[\![\langle\varphi_\sigma, \psi_\tau\rangle_{(\sigma\bullet\tau)}]\!]^{w,g} = \langle [\![\varphi]\!]^{w,g}, [\![\psi]\!]^{w,g}\rangle$

c. $[\![\lambda x_\sigma.\varphi_\tau]\!]^{w,g}$ = that function $h : D_\sigma \to D_\tau$ such that $h(d) = [\![\varphi]\!]^{w,g'}$ where $g'[x]g$ and $g'(x) = d$

d. $[\![\varphi_\sigma = \psi_\sigma]\!]^{w,g} = 1$ iff $[\![\varphi]\!]^{w,g} = [\![\psi]\!]^{w,g}$

e. $[\![\neg\varphi_t]\!]^{w,g} = 1$ iff $[\![\varphi]\!]^{w,g} = 0$

f. $[\![(\varphi_t \wedge \psi_t)]\!]^{w,g} = 1$ iff $[\![\varphi]\!]^{w,g} = [\![\psi]\!]^{w,g} = 1$

g. $[\![(\varphi_t \vee \psi_t)]\!]^{w,g} = 1$ iff $[\![\varphi]\!]^{w,g} = 1$ or $[\![\psi]\!]^{w,g} = 1$

h. $[\![(\varphi_t \to \psi_t)]\!]^{w,g} = 1$ iff $[\![\varphi]\!]^{w,g} = 0$ or $[\![\psi]\!]^{w,g} = 1$

i. $[\![\exists x_\sigma\varphi_t]\!]^{w,g} = 1$ iff there is a $g'[x]g$ such that $[\![\varphi]\!]^{w,g'} = 1$

j. $[\![\forall x_\sigma\varphi_t]\!]^{w,g} = 1$ iff for all $g'[x]g$ it holds that $[\![\varphi]\!]^{w,g'} = 1$

We employ several additional operators. For one, we make use of the Strawsonion iota-operator:

(113) $[\![\iota x_\sigma P_{\langle\sigma,t\rangle}(x)]\!]^{w,g}$ = the unique individual in D_σ that is in $[\![P]\!]^{w,g}$ if such a unique individual exists

Further, we make use of Link's (1983) and Landman's (1989) pluralization * and maximization operators σ and of our abbrevation $\mathbf{M}_{w'}(p)$. We assume an underlying complete join semilattice structure $\langle A, \oplus, \sqsubseteq\rangle$ for pluralities of possible worlds which is isomorphic to the set-theoretic lattice $\langle \wp(W) - \{\emptyset\}, \cup, \subseteq\rangle$ over the elements of the power set of the set of possible worlds W (assuming that the empty set is not included, see Landman 1989 for discussion)[36]. We furthermore require that the set of atoms of A is the set of possible worlds W. In other words, given a set $X \subseteq W$ of possible worlds, each non-empty subset of W can be identified with a corresponding plurality $\oplus X$ in A.

(114) For any p of type $\langle s, t\rangle$:

[35]Note that the angled pair brackets $\langle\cdot,\cdot\rangle$ occur as object language expressions in the formal language to indicate structured meanings, in the type specification to form complex (functional) types, and in the meta language to enclose pairs of interpretations.

[36]We refer the reader to (Link, 1983; Landman, 1989) for more detail on $\oplus$-sum formation, pluralization and the underlying lattice structures.

a. $[\![^*p]\!]^{w,g} = \{a \in A : \exists X \subseteq [\![p]\!]^{w,g} \text{ and } a = \oplus X\}$

b. $[\![\sigma(p)]\!]^{w,g} =$ the unique individual $a \in A$ such that $a \in [\![^*p]\!]^{w,g}$ and $\forall a' \in [\![^*p]\!]^{w,g} : a' \sqsubseteq a$

c. $[\![\mathbf{M}_{w'}(p)]\!]^{w,g} = [\![\sigma\big(\lambda w.p(w) \wedge R_{\mathsf{ep}}(w')(w)\big)]\!]^{w,g}$

For a reminder, $\mathbf{M}_{w'}(p)$ denotes the maximal sum of possible worlds where the proposition p is true and which are epistemic alternatives to w'. Here, as usual, epistemic alternatives are modeled by a relation R_{ep} between possible worlds, which will be used in the following to model the speaker's epistemic state.

Given $W = \{w, w', w''\}$, the following diagram illustrates the two lattices $\langle A, \oplus, \sqsubseteq\rangle$ and $\langle \wp(W) - \{\emptyset\}, \cup, \subseteq\rangle$ with their corresponding elements, ordered by $\sqsubseteq$ and $\subseteq$ from bottom to top, respectively.

(115)

$\underline{\langle A, \oplus, \sqsubseteq\rangle}$	$\underline{\langle \wp(W) - \{\emptyset\}, \cup, \subseteq\rangle}$
$w \oplus w' \oplus w''$	$\{w, w', w''\}$
$w \oplus w'$ $\quad$ $w \oplus w''$ $\quad$ $w' \oplus w''$	$\{w, w'\}$ $\quad$ $\{w, w''\}$ $\quad$ $\{w', w''\}$
w $\quad$ w' $\quad$ w''	$\{w\}$ $\quad$ $\{w'\}$ $\quad$ $\{w''\}$

Assuming a proposition $[\![p]\!]^{w,g} = \{w, w'\}$, we have $[\![^*p]\!]^{w,g} = \{w, w', w \oplus w'\}$ and thus $[\![\sigma(p)]\!]^{w,g} = w \oplus w'$. In general, we have $[\![\sigma(p)]\!]^{w,g} = \oplus[\![p]\!]^{w,g}$ (cf. Landman, 1989). Eventually, the set A of pluralities will serve as the semantic objects of type s from now on, i.e. we assume $D_s = A$ in the following.

Syntax and Semantic Composition. After having specified the formal representation language and its interpretation, we will now turn to our assumptions about syntactic and corresponding semantic derivations of our representations. To this end, we will not go into detail about all sub-clausal derivations[37], but focus on those points, where the novelties of our approach occur.

As a first step we need to take a closer look at the meaning contribution of the proform *then*. We take it that *then* restricts a proposition to some (salient) worlds, which is most clear with examples where *then* occurs alone without an overt *if*-clause as in the following example adapted from (Bhatt and Pancheva, 2006, p. 655).

(116) A: John comes to the party.
B: Well, then I will leave.

[37] All derivations proceed in a fairly standard manner, using intensional function application (IFA) as the basic composition rule: $\text{IFA}(\varphi_{\langle s,\langle\sigma,\tau\rangle\rangle}, \psi_{\langle s,\sigma\rangle}) = \lambda w.\varphi(w)\big(\psi(w)\big)$

E.g. the semantic combination of subject and verb of *The pastor snores* would proceed as follows:

$\text{IFA}(\lambda w\lambda x.\mathsf{snore}(w)(x), \lambda w.\iota x[\mathsf{pastor}(w)(x)]) = \lambda w'.\Big(\lambda x.\mathsf{snore}(w')(x)\big(\iota x[\mathsf{pastor}(w')(x)]\big)\Big)$
$= \lambda w'.\mathsf{snore}(w')(\iota x[\mathsf{pastor}(w')(x)])$

We note furthermore that structured meanings will not appear as functors or arguments in the meaning compositions that are explicated in the text, such that we will not need composition rules for these two cases. The interested reader is referred to (Krifka, 1992), where such rules are given and put to use.

In this exchange, B commits herself to leaving just in those cases where John comes to the party. We thus assume that *then* supplies a plurality w_{then} of the worlds of an antecedent proposition, which restricts the commitment of the speaker to this plurality of worlds in course of the performance of an assertive speech act. What exactly w_{then} refers to must be determined by context. In (116) it is most likely the plurality of worlds of the proposition that John comes, i.e.

$$w_{\text{then}} = \sigma(\lambda w.\mathsf{come\_to\_party}(w)(\mathsf{john})).$$

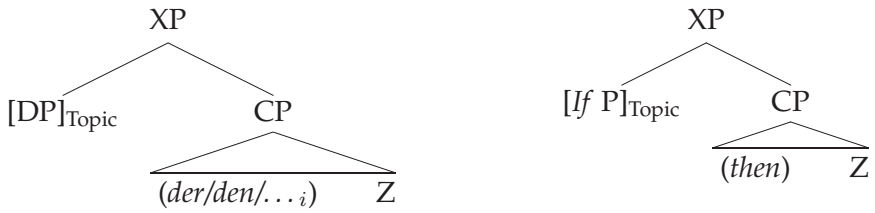
Formally, the semantic object that underlies such a speech act is implemented as a structured meaning that stores w_{then} in the first component and the expressed proposition in the second component. As indicated in the main text, we assume that *then* occupies [Spec, CP]. The interpretation rule for a CP with initial *then* is thus as in (117a).

(117) a. $[\![[\text{ then C' }]_{\text{CP}}]\!] = \langle w_{\text{then}}, [\![\text{C'}]\!] \rangle$ (*then* interpretation)
b. $[\![\text{then I will leave}]\!] = \langle w_{\text{then}}, \lambda w.\mathsf{leave}(w)(\mathsf{speaker}) \rangle$

Further below we will elaborate on later steps which formalize the application of speech act operators to such objects ensuring the desired restriction of speaker commitments.

We can now turn to the left dislocation structures we are after. We assume a uniform syntactic representation for both the nominal left dislocation case and the world/conditional case. The DP/*if*-clause is topic-marked in a left-peripheral position while the sister CP hosts the matrix/consequent clause with a possible resumptive *d*-pronoun/*then* occupying [Spec, CP].

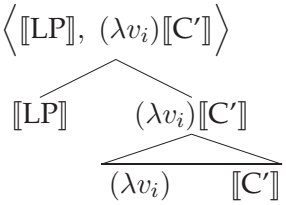
(118)



The semantic analysis proceeds parallel in both cases, as shown in the following semantic derivation. Here, the left-dislocated constituent (a DP/an *if*-clause) is abbreviated with LP. The resumptive pro-form R – if present – triggers lambda abstraction of the indexed variable v_i (of type e or s, indicated by λv_i) which is co-indexed with a corresponding variable inside the matrix/consequent clause. The tree in (119b) illustrates the combined results of applying the two compositional interpretation rules (119a):

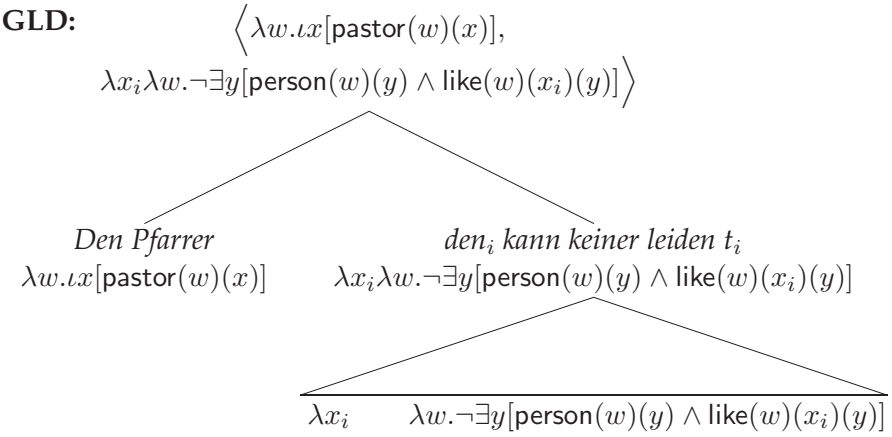
(119) a. $[\![[[\text{LP}]_{\text{Topic}} \text{ YP }]]\!] = \langle [\![\text{LP}]\!], [\![\text{YP}]\!] \rangle$ (topic-comment structuring)
$[\![[\text{R}_i \text{ C' }]]\!] = \lambda v_i [\![\text{C'}]\!]$ (resumptive pronoun abstraction)

b.



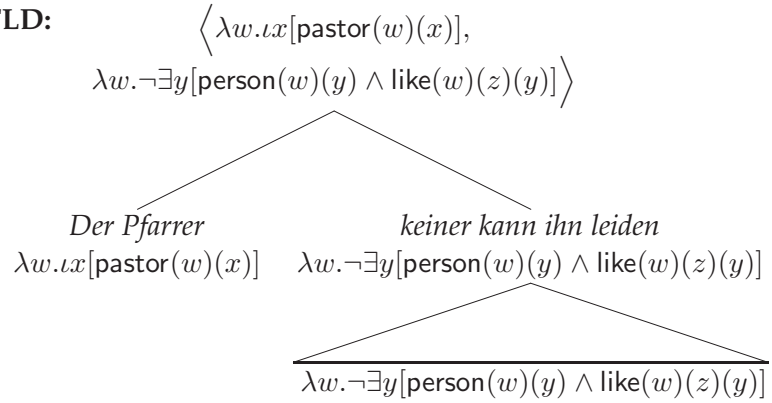
Thus we employ structured meanings to keep track of the topical, left-dislocated constituent in the first component and the matrix clause in the second component. For instance, we get the following result for the GLD example (33).

(120) **GLD:**



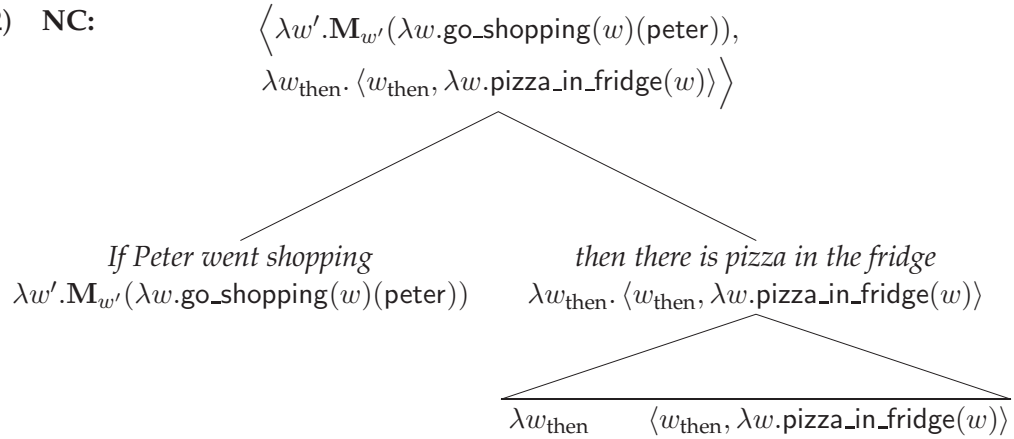
For the HTLD case, the derivation is virtually the same with the difference that there is no resumptive pronoun that could trigger lambda-abstraction. Consequently, we arrive at the following representation where the anaphoric pronoun *ihn* is translated by the free variable z.

(121) **HTLD:**



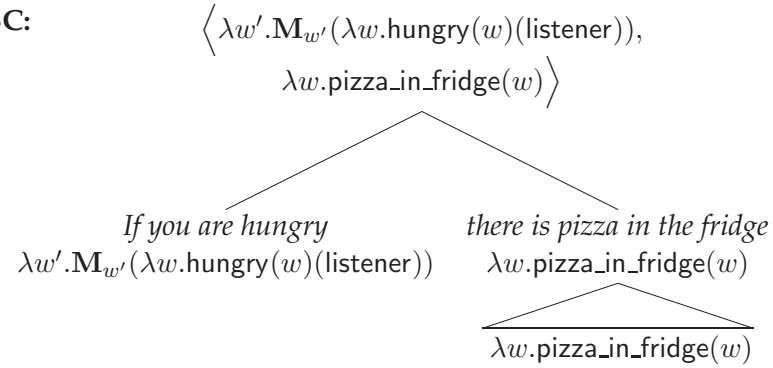
The derivations for the corresponding NC and BC readings run parallel to these cases. For an NC as (1) the derivation proceeds as follows. Here, the pro-form *then* again exhibits its restricting function as in (117a), but in addition triggers lambda-abstraction over the world variable w_{then} due to (119a). With regards to this dual nature, it behaves exactly like the resumptive *d*-pronoun, that also supplies a variable and triggers abstraction over it.

(122) **NC:**



Finally, the derivation of a BC as (2) differs again with respect to the presence of the resumptive pro-form, i.e. *then*.

(123) **BC:**



Speech & Reference Acts. As indicated above, the derived (structured) meanings are the semantic objects that speech acts operate on. For illustration, let us start with a non-structured meaning representation (124b) denoting the proposition that expresses the meaning of a simple sentence as (124a), where we assume no topic-marking to be present[38].

(124) a. Nobody likes the pastor.

b. $\lambda w.\neg\exists y[\mathsf{person}(w)(y) \wedge \mathsf{like}(w)(\iota x[\mathsf{pastor}(w)(x)])(y)]$

We formalize speech act performance by means of speech act operators that ask for two arguments: a (plurality of) possible world(s) of type s and an intensional object. In the case of assertions, this intensional object must be a proposition (of type $\langle s,t\rangle$) and the semantic-pragmatic effect is to express the speaker's commitment to the truth of the proposition in the given (plurality of) possible world(s).

(125) $\mathsf{ASSERT}\big(w, p_{\langle s,t\rangle}\big) \equiv$ the speaker commits herself to the truth of p in w

The precise effects of such an assertion on the development of the common ground shared by the interlocutors will be discussed in the next subsection.

[38] To enforce this thetic reading, consider the sentence uttered in the context of the question *What's up? What bothers you?*

To illustrate the definition of this operator, an out-of-the-blue assertion of (124a) commits the speaker to the truth of (124b) in w_0, the (plurality of) possible world(s) which are live candidates for the actual world.

(126) $\mathsf{ASSERT}(w_0, \lambda w.\neg\exists y[\mathsf{person}(w)(y) \wedge \mathsf{like}(w)(\iota x[\mathsf{pastor}(w)(x)])(y)])$

We assume that the first argument is filled with w_0 by default, i.e. in cases where there is no overt information available that would indicate a different world of evaluation.

An instance where such overt information is indeed available was given in (116). The derived semantic object for the assertion of the reply *Well, then I will leave* was the following structured meaning of type $(s \bullet \langle s,t\rangle)$, that contained the world corresponding to an antecedent proposition w_{then} and the proposition expressed by *I will leave*.

(127) $[\![\text{then I will leave}]\!] = \langle w_{\text{then}}, \lambda w.\mathsf{leave}(w)(\mathsf{speaker})\rangle$

Crucially, such a world-proposition-pair can also satisfy the argument requirements of the assertion operator[39].

(128) $\mathsf{ASSERT}(w_{\text{then}}, \lambda w.\mathsf{leave}(w)(\mathsf{speaker}))$

$\equiv$ the speaker commits herself to the truth of $\lambda w.\mathsf{leave}(w)(\mathsf{speaker})$ in w_{then}

In this way, the proform *then* serves to restrict (an assertion of) the proposition to the worlds of an antecedent proposition.

At this point we might add that other speech act operators could be devised to work in a similar fashion. In section 5.2 we briefly discussed questions and commands and in (92), repeated below, we indicated what a question operator might look like:

(129) $\mathsf{QUEST}\left(w, q_{\langle s,\langle s,t\rangle\rangle}\right) \equiv$ the speaker wants to know the truth of $q(w)$
i.e. she wants to know whether $w_0 \in q(w)$.

Like the assertion operator, the question operator requires a world argument and an intensional argument, this time of type $\langle s,\langle s,t\rangle\rangle$. In the following we will restrict attention to assertions again.

Turning to the most interesting cases of GLD/HTLD and NC/BCs, we note that none of the derived structured meanings in (120) to (123) is of the type that could supply the arguments for the ASSERT operator. In a sense this is to be expected since all constructions exhibit a bipartition into a left dislocated constituent, the topic, and an independent matrix clause remainder, the comment. Therefore, an utterance of one of these constructions does not straightforwardly constitute a single speech act, but rather a sequence of two speech acts that reflects this bipartition. This insight is captured in the following resolution strategy.

(130) **Speech Act Resolution:**

[39] To be completely precise, we might define an equivalent ASSERT′ operator that deals with pair-type arguments simply as $\mathsf{ASSERT}'(\langle w,\varphi\rangle) = \mathsf{ASSERT}(w,\varphi)$. We refrain from doing so, however, to keep the exposition as simple as possible.

If the utterance of a sentence S with meaning $[\![S]\!] = \langle \varphi, \psi \rangle$ cannot be understood as $\mathcal{O}(\langle \varphi, \psi \rangle)$ (where $\mathcal{O} \in \{\mathsf{ASSERT}, \mathsf{QUEST}, \ldots\}$) due to a type mismatch, then this utterance is understood as

$$\mathsf{REF}_X(w, \varphi) \;\&\; \mathcal{O}\big(\psi(X)\big).$$

where X is a novel discourse referent and w is supplied by context.

The topic establishment/reference act operator REF expects a world argument and an additional intensional object and its semantic/pragmatic effect is to introduce the individual denoted by the object in that world as the topic of conversation[40].

(131) $\mathsf{REF}_X\left(w, \varphi_{\langle s,\sigma \rangle}\right) \equiv$ the speaker draws the listener's attention to $\varphi(w)$

As in the case of other speech act operators, we take the world argument to be w_0 in absence of other information. The effect of the REF act[41] is to derive a referent $\varphi(w)$ from the first component of the structured meaning (i.e. the topic of the sentence) and introduce a novel discourse referent X for it. This discourse referent is then supplied as an argument to the second component ψ (i.e. the comment of the sentence), if $\psi(X)$ is of the appropriate type to yield a semantic object that can serve as argument to the speech act operator $\mathcal{O}$. For instance, for an assertion (i.e. for $\mathcal{O} = \mathsf{ASSERT}$) $\psi(X)$ must be of type $\langle s, t \rangle$ or $(s \bullet \langle s, t \rangle)$ according to the discussion above.

This will depend on the type of topicality that induced the structured meaning component in the first place. For aboutness topicality, the presence of the resumptive pronoun will facilitate the derivation of a predicate ψ that can combine with X. For relevance topicality, no such predicate will be derived and an application of ψ to X will fail to provide a suitable intensional object for the speech act operator.

The following table gives an overview of the involved types of the derived structured meaning representations (120)–(123) as well as the resulting type of $\psi(X)$ (as far as application is possible).

	type of φ	type of ψ	type of $\psi(X)$
(120) GLD	$\langle s, e \rangle$	$\langle e, \langle s, t \rangle \rangle$	$\langle s, t \rangle$
(121) HTLD	$\langle s, e \rangle$	$\langle s, t \rangle$	—
(122) NC	$\langle s, s \rangle$	$\langle s, (s \bullet \langle s, t \rangle) \rangle$	$(s \bullet \langle s, t \rangle)$
(123) BC	$\langle s, s \rangle$	$\langle s, t \rangle$	t

It is obvious from this table that in the cases of aboutness topicality (GLD/NC) the application $\psi(X)$ yields semantic objects that are of the right intensional type for the ASSERT operator. In the relevance topic cases (HTLD/BC), $\psi(X)$ is either undefined (HTLD) or does not yield an appropriate intensional object (BC).

[40] As mentioned in the main text, we restrict ourselves to individual concept objects of type $\langle s, e \rangle$ in this paper. However, in its general form this act also comprises cases of introducing suitably derived referents for other objects, such as generalized quantifiers, which can also occur in topic positions and serve as aboutness topics. We refer the reader to (Endriss, 2009) for more details on how such a general version of the REF act is to be defined.

[41] Again we defer a formal definition of these effects to the following section.

Therefore, no application of ψ to X will occur and ψ itself will be the argument to ASSERT.

To illustrate the resolution strategy at work, consider the GLD case (33), repeated in (132), where the underlying semantic object is the structured meaning derived in (120), repeated here:

$$\langle \underbrace{\lambda w.\iota x[\mathsf{pastor}(w)(x)]}_{\varphi}, \underbrace{\lambda x_i \lambda w.\neg\exists y[\mathsf{person}(w)(y) \wedge \mathsf{like}(w)(x_i)(y)]}_{\psi} \rangle$$

According to the speech act resolution strategy, the REF act establishes a novel discourse referent X for the topic of the sentence, i.e. the referent $\varphi(w_0)$ (since the world argument defaults to w_0). Then X is supplied as an argument to ψ, the predicate derived as the comment of the sentence, yielding a proposition suitable for the ASSERT operator. The resulting speech act sequence is as follows.

(132) **GLD**:
Den Pfarrer, den kann keiner leiden.
'The pastor nobody likes.'

$$\mathsf{REF}_X(w_0, \lambda w.\iota x[\mathsf{pastor}(w)(x)])$$
$$\& \ \mathsf{ASSERT}(w_0, \lambda w.\neg\exists y[\mathsf{person}(w)(y) \wedge \mathsf{like}(w)(X)(y)])$$

The combined semantic/pragmatic effects of the speech act sequence are thus: 1. drawing the listener's attention to the pastor and 2. committing the speaker to the truth of the statement that nobody likes him in w_0 (again by default). This is as desired and captures the effects of aboutness topicality that this example exhibits.

For the case of NC, the underlying structured meaning is given in (122), repeated below.

$$\langle \underbrace{\lambda w'.\mathbf{M}_{w'}(\lambda w.\mathsf{go\_shopping}(w)(\mathsf{peter}))}_{\varphi}, \underbrace{\lambda w_{\text{then}}.\langle w_{\text{then}}, \lambda w.\mathsf{pizza\_in\_fridge}(w)\rangle}_{\psi} \rangle$$

By application of the speech act analysis, a novel discourse referent X is established for the topical referent $\varphi(w_0) = \mathbf{M}_{w_0}(\lambda w.\mathsf{go\_shopping}(w)(\mathsf{peter}))$ by the REF act. Supplying this referent to ψ yields the structured meaning $\psi(X) = \langle X, \lambda w.\mathsf{pizza\_in\_fridge}(w)\rangle$, which is the representation we would get for the isolated sentence *Then there is pizza in the fridge* (cf. the representation (127) derived for B's utterance in (116)), with the crucial difference that the otherwise free world variable w_{then} is identified with X. This is a suitable object for the ASSERT operator, this time providing a world of evaluation X along with a proposition (again parallel to the example for stand-alone *then* in (128)).

(133) **NC**:
If Peter went shopping, then there is pizza in the fridge.

$$\mathsf{REF}_X\ (w_0, \lambda w'.\mathbf{M}_{w'}(\lambda w.\mathsf{go\_shopping}(w)(\mathsf{peter})))$$
$$\& \ \mathsf{ASSERT}(X, \lambda w.\mathsf{pizza\_in\_fridge}(w))$$

The combined effects of the speech acts are: 1. drawing the listener's attention to the world(s) where Peter went shopping and 2. committing the speaker to the truth of there pizza being in the fridge *in these worlds*. This is again as desired. As pointed out, the final assertion in this NC example is essentially the same as B's assertion in the context of A's assertion in (134), which is again a welcome result.

(134) A: Peter went shopping.
B: Then there is pizza in the fridge.

The HTLD and BC cases are analyzed along the same lines. As in these cases of relevance topicality the application of the comment ψ to X will not yield a suitable result, the assert operator will receive ψ as its sole argument, resulting in the following speech act sequences.

(135) a. **HTLD**:
Der Pfarrer, keiner kann ihn leiden.
'The pastor, nobody likes him.'

$$\mathsf{REF}_X(w_0, \lambda w.\iota x[\mathsf{pastor}(w)(x)]) \\ \& \ \mathsf{ASSERT}(w_0, \lambda w.\neg\exists z[\mathsf{person}(w)(z) \wedge \mathsf{like}(w)(z, y)])$$

b. **BC**:
If you are hungry, there is pizza in the fridge.

$$\mathsf{REF}_X\ (w_0, \lambda w'.\mathbf{M}_{w'}(\lambda w.\mathsf{hungry}(w)(\mathsf{listener}))) \\ \& \ \mathsf{ASSERT}(w_0, \lambda w.\mathsf{pizza\_in\_fridge}(w))$$

Crucially, the assertion of the BC case is performed with respect to the default w_0, yielding the desired result that the speaker is committed to the truth of the proposition ψ (that there is pizza in the fridge) in the actual world, despite a preceding REF act that draws the listener's attention to the antecedent worlds (where the listener is hungry).

Effects of Speech Acts. While we cannot go into further formal detail concerning the commitment effects of acts within the scope of this paper (see e.g. Krifka, to appear), we would like to discuss their effects on the common ground. We model the common ground (CG) c as a set of world/assignment pairs $c \subseteq W \times V$, where W is a set of possible worlds and V is the set of partial assignment functions from a set of discourse referents (DRs) into objects of the model. As usual, the notation $g'[x]g$ for two assignments g', g indicates that g' agrees with g everywhere except for x, including the case that g is undefined on x.

The update of the common ground with propositional information can happen in two basic forms (136). Update with a proposition of type $\langle s, t\rangle$ (a) and restriction to a plurality of possible worlds (b). Both come down to a simple eliminative update, leaving only those worlds that are in the proposition/that are atoms in the plurality. According to this view, w_0 stands for (the plurality of) all worlds that the speaker entertains as live alternative candidates for the actual world, i.e. for the context set. Therefore, a restriction of c to w_0 does not have any effect on c. For convenience, we also define restriction of the CG to the complement of a plurality (c). We also include the introduction of a new discourse

referent at this point by means of an update of the CG with $\exists x$ for some discourse referent x (d).

(136) **Propositional Update:**

(a) $c + \varphi_{\langle s,t\rangle} = \{(w,g)|(w,g) \in c \text{ and } [\![\varphi]\!]^{w,g}(w) = 1\}$

(b) $c + w'_s = \{(w,g)|(w,g) \in c \text{ and } w \text{ is an atomic part of } [\![w']\!]^{w,g}\}$

(c) $c - w'_s = \{(w,g)|(w,g) \in c \text{ and } w \text{ is not an atomic part of } [\![w']\!]^{w,g}\}$

(d) $c + \exists x = \{(w,g')|(w,g) \in c \text{ and } g'[x]g\}$

Eventually, the update of the common ground by performance of a speech act comes down to appropriate propositional updates. In particular, we need to restrict attention of an assertive update to those worlds mentioned in the first argument. For instance, if a speaker performs

$$\mathsf{ASSERT}\big(\mathbf{M}_{w_0}(\lambda w.\mathsf{go\_shopping}(w)(\mathsf{peter})), \lambda w.\mathsf{pizza\_in\_fridge}(w)\big)$$

she commits herself to the truth of $\lambda w.\mathsf{pizza\_in\_fridge}(w)$ in all worlds of the plurality $\mathbf{M}_{w_0}(\lambda w.\mathsf{go\_shopping}(w)(\mathsf{peter})$, i.e. the epistemically accessible worlds where $\lambda w.\mathsf{go\_shopping}(w)(\mathsf{peter})$ is true. Definition (137a) takes care of this restriction.

The effect of the REF_X act is quite straightforward. A new DR X which refers to the denotation of the topic constituent $d_{\langle s,\sigma\rangle}(w)$ is introduced by means of a CG update with $\exists X$ and a subsequent update that establishes the reference[42] of X.

(137) **Speech Act Update:**

(a) $c \oplus \mathsf{ASSERT}\big(w, \varphi_{\langle s,t\rangle}\big) = (c - w) \cup (c + w + \varphi)$

(b) $c \oplus \mathsf{REF}_X\ \big(w, d_{\langle s,\sigma\rangle}\big) = c + \ \exists X \ + \ X = d_{\langle s,\sigma\rangle}(w)$

In the following we illustrate the update of the CG after a speaker's utterance of

[42] Again, we simplify matters considerably by letting X refer to $d_{\langle s,\sigma\rangle}(w)$ directly (137b). This works fine for referential topics such as proper names or definite descriptions. For the case of quantificational topics, we would need to derive a proper representative by means of minimal witness sets first in order to capture the correct readings. Since we do not deal with these more sophisticated cases in this paper, we use the simple variant of direct reference and we point the reader to (Endriss, 2009) for further detail.

the NC (1), analyzed as the sequence of speech acts in (133).

$$
\begin{aligned}
c' &= c \oplus \mathsf{REF}_X\,(w_0, \lambda w'.\mathbf{M}_{w'}(\lambda w.\mathsf{shopping}(w)(\mathsf{peter})))\\
&= c + \exists X + X = \mathbf{M}_{w_0}(\lambda w.\mathsf{shopping}(w)(\mathsf{peter}))\\
&= \{(w,g')|(w,g) \in c \text{ and } g'[X]g\} + X = \mathbf{M}_{w_0}(\lambda w.\mathsf{shopping}(w)(\mathsf{peter}))\\
&= \{(w,g')|(w,g) \in c \text{ and } g'[X]g \text{ and } [\![X = \mathbf{M}_{w_0}(\lambda w.\mathsf{shopping}(w)(\mathsf{peter}))]\!]^{w,g'} = 1\}\\
&= \{(w,g')|(w,g) \in c \text{ and } g'[X]g \text{ and } g'(X) = s\}\\
&\qquad\qquad \text{where } s \text{ is the maximal sum object of the set of worlds } w'\\
&\qquad\qquad\qquad \text{where } [\![\lambda w.\mathsf{shopping}(w)(\mathsf{peter})]\!]^{w,g}(w') = 1
\end{aligned}
$$

$$
\begin{aligned}
c'' &= c' \oplus \mathsf{ASSERT}(X, \lambda w.\mathsf{pizza\_in\_fridge}(w))\\
&= (c' - X) \cup (c' + X + \lambda w.\mathsf{pizza\_in\_fridge}(w))\\
&= \{(w,g')|(w,g) \in c \text{ and } g'[X]g \text{ and } g'(X) = s \text{ and } w \text{ is not an atom of } s\}\\
&\qquad\qquad \cup (c' + X + \lambda w.\mathsf{pizza\_in\_fridge}(w))\\
&= \{(w,g')|(w,g) \in c \text{ and } g'[X]g \text{ and } g'(X) = s \text{ and } [\![\lambda w.\mathsf{shopping}(w)(\mathsf{peter})]\!]^{w,g}(w) = 0\}\\
&\qquad\qquad \cup (c' + X + \lambda w.\mathsf{pizza\_in\_fridge}(w))\\
&= \{(w,g')|(w,g) \in c \text{ and } g'[X]g \text{ and } g'(X) = s \text{ and } [\![\lambda w.\mathsf{shopping}(w)(\mathsf{peter})]\!]^{w,g'}(w) = 0\}\\
&\qquad \cup \{(w,g')|(w,g) \in c \text{ and } g'[X]g \text{ and } g'(X) = s\\
&\qquad\qquad \text{and } [\![\lambda w.\mathsf{shopping}(w)(\mathsf{peter})]\!]^{w,g'}(w) = 1 \text{ and } [\![\lambda w.\mathsf{pizza\_in\_fridge}(w)]\!]^{w,g'}(w) = 1\}
\end{aligned}
$$

The result c'' of the complete CG update is as desired: A new DR has been established that refers to the plurality of worlds where it is true that Peter went shopping and in all worlds in c'' either it is false that Peter went shopping or it is true that Peter went shopping *and* pizza is in the fridge.

The update in case of the BC (2) runs analogously. The differences lie in the antecedent proposition and the fact that the assertive update proceeds with respect to w_0 as indicated by the speech act sequence in (135b).

$$
\begin{aligned}
c' &= c \oplus \mathsf{REF}_X\,(w_0, \lambda w'.\mathbf{M}_{w'}(\lambda w.\mathsf{hungry}(w)(\mathsf{listener})))\\
&= \{(w,g')|(w,g) \in c \text{ and } g'[X]g \text{ and } g'(X) = s\}\\
&\qquad\qquad \text{where } s \text{ is the maximal sum object of the set of worlds } w'\\
&\qquad\qquad\qquad \text{where } [\![\lambda w.\mathsf{hungry}(w)(\mathsf{listener})]\!]^{w,g}(w') = 1
\end{aligned}
$$

$$
\begin{aligned}
c'' &= c' \oplus \mathsf{ASSERT}(w_0, \lambda w.\mathsf{pizza\_in\_fridge}(w))\\
&= (c' - w_0) \cup (c' + w_0 + \lambda w.\mathsf{pizza\_in\_fridge}(w))\\
&= c' + \lambda w.\mathsf{pizza\_in\_fridge}(w)\\
&= \{(w,g')|(w,g) \in c \text{ and } g'[x]g \text{ and } g'(X) = s \text{ and } [\![\lambda w.\mathsf{pizza\_in\_fridge}(w)]\!]^{w,g'}(w) = 1\}
\end{aligned}
$$

The result is again as desired. The introduced discourse referent refers to the plurality of worlds where it is true that the listener is hungry and in all worlds in the CG it is true that pizza is in the fridge.

Binding. In the case of GLD, the left dislocated phrase receives an interpretation of (intensional) functional type $\langle s, \langle e, e\rangle\rangle$ (138a). Accordingly, the trace is of the same functional type and combines with the matrix verb, which is type-shifted by application of Jacobson's Z-operator (Jacobson, 1999) to facilitate its combination with a functional element (138b). The resumptive element again triggers lambda-abstraction which will eventually serve to pick up the topical discourse referent F, introduced by the REF act, as an argument within the matrix proposition (138c,d) (see Ebert and Endriss, 2007, for more detail on the nominal case).

(138) a. $[\![\text{seinen Vater}]\!] = \lambda w \lambda y.\iota x[\mathsf{father\_of}(w)(y)(x)]$

b. $Z = \lambda R_{\langle s,\langle e,\langle e,t\rangle\rangle\rangle} \lambda f_{\langle s,\langle e,e\rangle\rangle} \lambda w \lambda x_e.R(w)(f(w)(x))(x)$

c. $[\![\text{den}_i \text{ verehrt jeder t}_i]\!]$

$= \lambda f \lambda w.\forall y[\mathsf{person}(w)(y) \rightarrow Z(\mathsf{admire})(w)(f)(y)]$

$= \lambda f \lambda w.\forall y[\mathsf{person}(w)(y) \rightarrow \mathsf{admire}(w)(f(w)(y))(y)]$

d. $\mathsf{REF}_F(w_0, \lambda w \lambda y.\iota x[\mathsf{father\_of}(w)(y)(x)])$

$\&\ \mathsf{ASSERT}(w_0, \lambda w.\forall y[\mathsf{person}(w)(y) \rightarrow \mathsf{admire}(w)(F(w)(y))(y)])$

For NCs as (41), repeated as (139a), the derivation proceeds parallel to the GLD case. The major difference is the functional type of the *if*-clause, which is construed as functions from individuals into (maximal sums of) possible worlds. Accordingly, we take it that *dann/then* introduces and lambda-abstracts over a functional variable f_{then} of type $\langle e, s\rangle$, in analogy to the non-functional case above. This in turn poses a condition on the matrix proposition itself, since we require that this proposition can be evaluated at the variable introduced by *then*. Effectively, this will result into a coercion of the proposition into the type $\langle\langle e, s\rangle, t\rangle$. This coercion into a functional type, which is triggered by the presence of *then*, is the crucial difference to the BC cases below.

Accordingly, Z_s is an adapted version of Jacobson's Z to enable compositions with the functional type $\langle e, s\rangle$ (139b). The derivation of the *if*-clause and the consequent clause is shown in (139c,d).

(139) a. Wenn man sie$_i$ gut pflegt, dann blüht [jede Orchidee]$_i$
if one it well groom then blossoms every orchid
mehrmals im Jahr.
several times in the year
'Every orchid blossoms several times a year, if you groom it well.'

b. $Z_s = \lambda R_{\langle\langle s,e\rangle,t\rangle} \lambda f_{\langle e,s\rangle} \lambda x_e R(f(x))(x)$

c. $[\![\text{wenn man sie gut pflegt}]\!] = \lambda w' \lambda x.\mathbf{M}_{w'}(\lambda w.\mathsf{well\_groomed}(w)(x))$

d. $[\![\text{dann blüht jede Orchidee mehrmals im Jahr}]\!]_{\langle\langle e,s\rangle,(\langle e,s\rangle \bullet \langle\langle e,s\rangle,t\rangle)\rangle}$

$= \lambda f_{\text{then}}.\langle f_{\text{then}}, \lambda f_{\langle e,s\rangle}.\forall y[\mathsf{orchid}(y)$

$\rightarrow Z_s(\mathsf{blossom\_several\_times\_in\_year})(f)(y)]\rangle$

$= \lambda f_{\text{then}}.\langle f_{\text{then}}, \lambda f_{\langle e,s\rangle}.\forall y[\mathsf{orchid}(y)$

$\rightarrow \mathsf{blossom\_several\_times\_in\_year}(f(y))(y)]\rangle$

In order to spell out the speech acts and their effects for these representations of functional type, we extend the definition of the ASSERT operator to also take two arguments of functional types $\langle e, s\rangle$ and $\langle\langle e, s\rangle, t\rangle$ (or one argument of the respective pair type $(\langle e, s\rangle \bullet \langle\langle e, s\rangle, t\rangle)$, as before.

(140) $\mathsf{REF}_F(w_0, \lambda w'\lambda x.\mathbf{M}_{w'}(\lambda w.\mathsf{well\_groomed}(w)(x))$
$\quad \& \ \mathsf{ASSERT}(F, \lambda f.\forall y[\mathsf{orchid}(y)$
$\quad \rightarrow \mathsf{blossom\_several\_times\_in\_year}(f(y))(y)])$

We furthermore have to adapt the propositional and the speech act CG update rules. The corresponding propositional updates create temporary common grounds of a functional sort as well. In (141a) the restriction of the CG to a function from individuals to a plurality of worlds F is described. It is defined pointwise for each individual d in the domain D_e as the standard CG restriction (136b) to a plurality of worlds $[\![F]\!]^{w,g}(d)$, which is assigned by F to that individual. In other words, it consists of pairs of individuals and (standard) common ground objects. The update with functionalized proposition of type $\langle\langle e, s\rangle, t\rangle$ creates a standard CG again (141b). This clause takes care of the pointwise evaluation for each individual.

(141) **Propositional Update (Functional):**

(a) $c + F_{\langle e,s\rangle} = \Big\{\Big(d \in D_e, \{(w,g) \mid (w,g) \in c$ and w is an atomic part of $[\![F]\!]^{w,g}(d)\}\Big)\Big\}$

(b) $c + \varphi_{\langle\langle e,s\rangle,t\rangle} = \Big\{(w,g) \mid (w,g) \in c$ and $[\![\varphi]\!]^{w,g}(\mathcal{F}_c) = 1\Big\}$
where $\mathcal{F}_c : D \rightarrow W$, and
$\mathcal{F}_c(d)$ is the maximal sum object of the set
$\{w \mid (d, c_d) \in c$ and $(w,g) \in c_d\}$

We can now make the following straightforward addition to the speech act update rule to deal with the functional cases.

(142) **Speech Act Update (Functional):**

$c \oplus \mathsf{ASSERT}\big(F_{\langle e,s\rangle}, \varphi_{\langle\langle e,s\rangle,t\rangle}\big) = (c + F + \varphi)$

To illustrate these definitions, we go through the update of the speech act sequence in (139e)[43].

$c' = c \oplus \mathsf{REF}_F(w_0, \lambda w'\lambda x.\mathbf{M}_{w'}(\lambda w.\mathsf{well\_groomed}(w)(x)))$
$= c + \exists F + F = \lambda x.\mathbf{M}_{w'}(\lambda w.\mathsf{well\_groomed}(w)(x))$
$= \{(w,g') | (w,g) \in c$ and $g'[F]g\} + F = \lambda x.\mathbf{M}_{w'}(\lambda w.\mathsf{well\_groomed}(w)(x))$
$= \{(w,g') | (w,g) \in c$ and $g'[F]g$ and $g'(F) = f\}$
where f is a function from individuals d to the
maximal sum object of the set of worlds w'
where $[\![\lambda w.\mathsf{well\_groomed}(w)(x)]\!]^{w,g[x\mapsto d]}(w') = 1$

[43] Here, $g[x \mapsto d]$ stands for the assignment $g'[x]g$ such that $g'(x) = d$.

$$c'' + c' \ \oplus\ \mathsf{ASSERT}(F, \lambda f.\forall y[\mathsf{orchid}(y) \rightarrow \mathsf{blossom}(f(y))(y)])$$
$$= c' + F + \lambda f.\forall y[\mathsf{orchid}(y) \rightarrow \mathsf{blossom}(f(y))(y)]$$

$$c''' = c' + F$$
$$= \Big\{ \Big(d, \{(w, g') \mid (w, g) \in c, g'[F]g, g'(F) = f \text{ and } w \text{ is an atomic part of } f(d)\ \} \Big) \mid d \in D_e \Big\}$$
$$= \Big\{ \Big(d, \{(w, g') \mid (w, g) \in c, g'[F]g, g'(F) = f$$
$$\text{and } [\![\lambda w.\mathsf{well\_groomed}(w)(x)]\!]^{w, g'[x \mapsto d]}(w) = 1\} \Big) \mid d \in D_e \Big\}$$

$$c'' = c''' + \lambda f.\forall y[\mathsf{orchid}(y) \rightarrow \mathsf{blossom}(f(y))(y)]$$
$$= \Big\{ (w, g') \mid (w, g) \in c, g'[F]g, g'(F) = f$$
$$\text{and } [\![\lambda f.\forall y[\mathsf{orchid}(y) \rightarrow \mathsf{blossom}(f(y))(y)]]\!]^{w, g'}(\mathcal{F}_{c'''}) = 1 \Big\}$$
$$= \Big\{ (w, g') \mid (w, g) \in c, g'[F]g, g'(F) = f$$
$$\text{and } [\![\forall y[\mathsf{orchid}(y) \rightarrow \mathsf{blossom}(f(y))(y)]]\!]^{w, g'[f \mapsto \mathcal{F}_{c'''}]} = 1 \Big\}$$

$\mathcal{F}_{c'''} =$ a function from individuals d to the maximal sum object
of the set of worlds $\{w_d \mid (d, c_d) \in c'''$ and $(w_d, g_d) \in c_d\}$

$\mathcal{F}_{c'''}(g'(y)) =$ the maximal sum object
of the set of worlds $\{w_d \mid (g'(y), c_d) \in c'''$ and $(w_d, g_d) \in c_d\}$

$=$ the maximal sum object of the set of worlds
$\{w_d \mid (w_d, g) \in c, g_d[F]g, g_d(F) = f$
and $[\![\lambda w.\mathsf{well\_groomed}(w)(x)]\!]^{w_d, g_d[x \mapsto g'(y)]}(w_d) = 1\}$

$=$ the maximal sum object of the set of worlds w_d where
$[\![\lambda w.\mathsf{well\_groomed}(w)(x)]\!]^{w_d, g_d[x \mapsto g'(y)]}(w_d) = 1\}$

Therefore, the update of a CG c with (139e) retains all worlds w which satisfy the following[44].

(143) For all $d \in D_e$: $[\![\mathsf{orchid}]\!]^{w,g}(d) = 0$ or $[\![\mathsf{orchid}]\!]^{w,g}(d) = 1$
and $[\![\mathsf{blossom}]\!]^{w,g}([\![\sigma(\lambda w.\mathsf{well\_groomed}(w)(x))]\!]^{w,g[x \mapsto d]})(d) = 1$

In other words, all worlds survive the update where each orchid blossoms in those worlds where it is well groomed. This is as desired.

For the BC case, the essential ingredients are the same as before. According to our construal, the assertion speech act of the consequent is treated as independent, i.e. wrt. the actual world w_0. Since *then* is not present, no functional element is involved in the derivation of the matrix-CP denotation, which hence comes out as (144b). The overall result of topic interpretation is thus (144c).

(144) a. *Wenn Du etwas über sie$_i$ wissen willst, [jede Orchidee]$_i$
if you something about it to know want every orchid
blüht mehrmals im Jahr.
blossoms several times in the year

[44] With respect to variable assignments g that are defined on F as $g(F) = f$ as above.

b. [[jede Orchidee blüht mehrmals im Jahr]]
$= \lambda w.\forall y[\mathsf{orchid}(y) \rightarrow \mathsf{blossom\_several\_times\_in\_year})(w)(y)]$

c. $\mathsf{REF}_F(w_0, \lambda w' \lambda x.\mathbf{M}_{w'}(\lambda w.\mathsf{want\_to\_know\_sth\_about}(w)(\mathsf{listener}, x))])$
& $\mathsf{ASSERT}(w_0, \lambda w.\forall y[\mathsf{orchid}(y)$
$\rightarrow \mathsf{blossom\_several\_times\_in\_year}(w)(y)])$

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