Proceedings of Sinn und Bedeutung 11, E. Puig-Waldmüller (ed.), Barcelona: Universitat Pompeu Fabra, pp.463-478.

WHAT ASYMMETRIC COORDINATION IN GERMAN TELLS US ABOUT THE SYNTAX AND SEMANTICS OF CONDITIONALS*

Ingo Reich,
Universität Tübingen

ingo.reich@uni-tuebingen.de

Abstract

Although there is a vast amount of literature on the semantics of conditionals, there is usually little said about the way conditionals are interpreted compositionally. And if there is, it is often suggested that it suffices to consider conditionals like "*if S1, then S2*", taking for granted that coordinate structures like "*if S1 and S2, then S3*" can be reduced in form to the former, for it seems quite obvious that coordination takes place within the syntactic scope of *if* (i.e., we have "*if [S1 and S2], then S3*"). In this paper, I will argue that this is not obvious at all. I will show that there is good empirical evidence that (at least) in the case of so-called Asymmetric Coordination in German (Höhle 1990) coordination does not take place within the syntactic scope of *if* (i.e., we have "*[[if S1] and S2], then S3*"). This apparently gives rise to a mismatch between syntax and semantics, which —if I am right— can only be (straightforwardly) resolved in a Lewis/Kratzer approach to the semantics of conditionals. To account for some problems related to distributive readings, I will finally propose that *if* is to be interpreted as a variable picking up a modal base in context.

1 Introduction

Although there is a vast amount of literature on the semantics of conditionals, there is usually little said about the way conditionals are interpreted compositionally. And if there is, it is often suggested that it suffices to consider conditionals like "*if S1, then S2*", taking for granted that coordinate structures like "*if S1 and S2, then S3*" can be reduced in form to the former, for it seems quite obvious that coordination takes place within the syntactic scope of *if*. In this paper, I will argue that this is not obvious at all. I will show that there is good empirical evidence that (at least) in the case of so-called Asymmetric Coordination in German (Höhle 1990) coordination does not take place within the syntactic scope of *if*. This apparently gives rise to a mismatch between syntax and semantics, which —if I am right— can only be (straightforwardly) resolved in (some variant of) a Lewis/Kratzer approach to the semantics of conditionals.

2 Asymmetric Coordination in German

To get a rough idea what "Asymmetric Coordination" (AC) in German is about, first note that in German *if*-clauses the finite predicate is always in verb final position, see (1).

(1) Wenn du nach Barcelona gehst, dann besuch das Museo Picasso.
if you to Barcelona go, then visit the Museo Picasso
'If you go to Barcelona, then visit the Museo Picasso'

*I want to thank Asaf Bachrach, Cathrine Fabricius-Hansen, Kai von Fintel, Tilman Höhle, Claudia Maienborn, Jürgen Pafel, Doris Penka, Marga Reis, Philippe Schlenker, Arnim von Stechow, Wolfgang Sternefeld, Hubert Truckenbrodt, and audiences at the universities of Potsdam, Göttingen, Tübingen, and at the conference "Sinn und Bedeutung 11", Barcelona, for helpful comments and stimulating discussion.

As (2) shows, this is typically also true in the case of sentential coordination, i.e., standard sentential coordination in German is symmetric with respect to the order of the finite verb.

(2) Wenn du nach Barcelona gehst und die Formel 1 dort gerade Station macht, [...]
If you to Barcelona go and the Formula 1 there just stop makes, [...]
'If you go to Barcelona and the Formula 1 is just making a stop there, ...'

However, given quite specific semantic circumstances —i.e., given what is called a 'fusioning semantics' or 'one-event interpretation'—,[1] there is also the (restricted) possibility of "asymmetric (sentential) coordination (AC)" (Höhle 1990), i.e., the possibility of coordinating sentential structures that differ with respect to the order of their finite predicates. (3), for example, is a perfectly fine AC of a verb final clause (VL) with a verb second clause (V2). (4) illustrates an AC consisting of a verb final clause followed by a *prima facie* verb first clause (V1). ((4) is an instance of so-called SLF-coordination ("Subject Lacking in F-structure"), the verb first property of the second conjunct apparently being related to the missing subject.[2])

(3) Wenn du nach Barcelona gehst und dort ist schönes Wetter, dann [...]
If you to Barcelona go and there is nice weather, then [...]
'If you go to Barcelona, and there is nice weather, then [...]'

(4) Wenn du nach Barcelona gehst und möchtest dort etwas Spaß haben, dann [...]
If you to Barcelona go and want there some fun have, then [...]
'If you go to Barcelona and want to have some fun, then [...]'

For our purposes here it is not important, why AC is possible in German in the first place (but see (Höhle 1990) and Reich (2007a) for relevant discussion); what is important though, is the fact that it does exist and that it shows interesting (and unexpected) structural properties.

2.1 Asymmetric Coordination and Negation

To see this, let's first consider the behavior of negation in AC. As Höhle (1983) observes, the negation *nicht* ("not") can have wide scope relative to the coordinating conjunction *und* ("and") in V2-initial[3] instances of SLF-coordination. Suppose, for example, that Hans is one of those clumsy people who always drop stuff and get easily hurt. In such a context (5) is understood as expressing the hope that Hans won't (be able to) help carry at the move.

(5) Hoffentlich kommt Hans nicht zum Umzug und hilft uns beim Tragen.
Hopefully shows up Hans not at the move and helps us carry
'I hope Hans doesn't show up at the move and help us carry.'

Something similar, though not exactly the same —note that in (5) Hans may show up at the move as long as he does not help carry, whereas for (6) to be true he must not show up, and, as a consequence, won't be able to help carry—, is true of the VL-symmetric coordination (6).

[1]See Höhle (1983), Reich (2007a), and Reich (2007b) for detailed discussion as well as a possible construal.

[2]It is by no means evident why the subject (and only the subject) can be dropped in SLF-coordination —and why this should result in a verb first rather than a verb second structure; see, inter alia, Höhle (1983), Wunderlich (1988), Büring and Hartmann (1998), Frank (2002), Fortmann (2005), and Reich (2007b) for discussion.

[3]An AC is called VX-initial ($X = 1, 2, L$), if its first conjunct shows VX verb order. In AC, non-initial conjuncts are systematically restricted to V2- or —in the case of SLF-coordination— V1-order (to the exclusion of VL).

(6) Als er nicht zum Umzug kam und uns beim Tragen half, [...]
When he not at the move showed up and us carry helped, [...]
'When he didn't show up at the move and help us carry, ... '

If we consider, however, the corresponding VL-initial SLF-coordination in (7), we observe that this time the wide-scope reading of *nicht* is —quite surprisingly— unavailable.

(7) #Als er nicht zum Umzug kam und half uns beim Tragen, [...]
When he not at the move showed up and helped us carry, [...]
'When he didn't show up at the move and help us carry, ... '

This observation nicely fits with an older observation made in Wunderlich (1988): The negative quantifier *keiner* ("nobody") is excluded as a possible subject in VL-initial SLF-coordination, see (8), though it is perfectly fine in V2-initial SLF-coordination, see (9).

(8) *Wenn uns keiner willkommen heißt und schließt uns in die Arme, dann [...]
If us nobody welcomes and gives us a hug, then [...]
'If nobody welcomes us and gives us a hug, then [...]'

(9) Leider heißt uns keiner willkommen und schließt uns in die Arme.
Unfortunately welcomes us nobody and gives us a hug.
'Unfortunately nobody welcomes us and gives us a hug.'

2.2 Asymmetric Coordination and Pronoun Binding

This restriction on possible subjects could be due to the fact that *keiner* is negative; it could also be due to the fact that *keiner* is quantificational; and it could, of course, be due to a cumulative effect. That probably the latter is true, is suggested by the following observation: In VL-initial instances of AC (in contrast to V2-initial ones), quantificational subjects in the first conjunct can not (easily) bind pronouns in the second conjunct. To see this, consider (10) and (11).

(10) Wenn heute jeder$_i$ frei kriegt und sich$_i$ etwas seinen$_i$ Kindern widmen kann,
If today everyb. off gets and REFL some time his children devote can,
'If today everybody gets a day off and can devote some time to his children'

(11) ??Wenn heute jeder$_i$ frei kriegt und kann sich$_i$ etwas seinen$_i$ Kindern widmen,
If today everyb. off gets and can REFL some time his children devote,
'If today everybody gets a day off and can devote some time to his children'

(10) is a case of symmetric sentential coordination, and binding of the reflexive pronoun *sich* and the possessive pronoun *seinen* ("his") by *jeder* ("everybody") is fine. (11), on the other hand, is a case of VL-initial asymmetric coordination, and the corresponding binding relations seem to be quite bad. Though data like (11) are hard to judge, grammaticality judgements are pretty stable when contrasting the AC in (11) with its symmetric variant in (10). Binding of a possessive pronoun located within the subject of an AC is completely out, see (12).

(12) *Wenn heute jeder$_i$ vorbeikommt und seine$_i$ Frau begleitet ihn, [...]
If today everybody drops by and his wife accompanies him, [...]
'If today everybody drops by and his wife accompanies him, [...]'

To be sure, the fact that quantificational subjects can not (easily) bind pronouns in the second conjunct of an AC is not simply due to the asymmetry of the construction. This is evidenced by the V2-initial asymmetric coordination in (13) which is, again, perfectly fine.

(13) Heute kriegt jeder$_i$ frei und kann sich$_i$ etwas seinen$_i$ Kindern widmen.
Today gets everyb. off and can REFL some time his children devote.
'Today, everybody gets a day off and can devote some time to his children.'

Let's take stock here. We saw that in V2-initial (and V1-initial) AC —first— negation can have wide scope with respect to the coordinating conjunction *and*, and —second— a quantificational subject (including *keiner* ("nobody")) can bind pronouns in the second conjunct. These insights are common wisdom since Höhle (1983). Building partly on Wunderlich (1988), I argued, however, that —quite unexpectedly— VL-initial AC (exemplified by *if*- and *when*-clauses) behaves completely different from its V2-initial (and V1-initial) counterparts in that negation can *not* have wide scope with respect to *and*, and quantificational subjects in the first conjunct (with the notable exception of indefinites) do *not* (easily) bind pronouns in the second conjunct.

2.3 On the Syntax of Asymmetric Coordination

In Höhle (1990) the properties of V2-initial (and V1-initial) AC are accounted for by assuming that the second conjunct in an AC is an adjunct to the VP of the first conjunct. This way, the subject of the first conjunct c-commands —and, thus, is apparently able to bind— pronouns in the second conjunct; the negation *nicht* —likewise being an adjunct to VP— gets scope over the second conjunct by adjoining it to VP 'after' the second conjunct does.

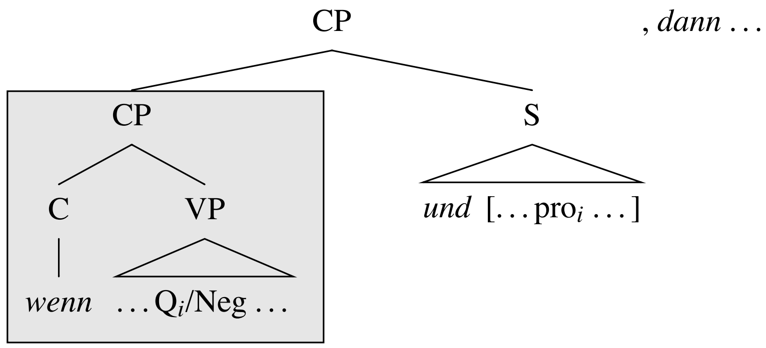
The obvious question to ask then is: Is it possible to analyze VL-initial AC structurally parallel to V2-initial (and V1-initial) AC? —Apparently it is not. If we did, we would predict, of course, that VL-initial AC behaves parallel to V2-initial (and V1-initial) AC with respect to the behavior of negation and the binding of pronouns. (All the more, since in AC, in contrast to standard symmetric coordination, overt asymmetric extraction of (quantificational) DPs is licit (Höhle 1983), and, thus, asymmetric quantifier raising should be, too.) In particular, we can not avoid to predict that possessive pronouns within the subject of the second conjunct of an AC get bound by the (quantificational) subject of the first conjunct, which is clearly out.

How, then, do we account for the difference in behavior between V1/V2-initial AC on the one hand, and VL-initial AC on the other hand, without losing the prediction that all kinds of AC behave completely parallel in other respects (e.g., with respect to extraction properties, ellipsis etc.)? The proposal I want to put forward here is that we basically stick to the adjunction analysis, but that we allow in addition to sentence-internal adjunction (to VP) for sentence-external adjunction, i.e., adjunction to CP. The empirical generalization, thus, is that in the case of V1/V2-initial AC adjunction takes place at VP-level, whereas in the case of VL-initial AC adjunction takes place at CP-level. Why this is so, i.e., why a finite predicate in sentence final position blocks sentence-internal adjunction of a V1/V2-clause (and only of a V1/V2-clause), is (still) unclear to me. However, as we will see immediately, it gets the facts right, and, what's more, it is a reasonable and theoretically viable restriction within an adjunction approach.

Now, if we do assume that in VL-initial cases of AC like (14), the second conjunct attaches sentence-externally, i.e., to CP, how does that account for the contrasts observed above?

(14) *Wenn heute keiner$_i$ frei kriegt und kann sich$_i$ um seine$_i$ Kinder kümmern, [...]
If today noone off gets, and can REFL after his children look, [...]

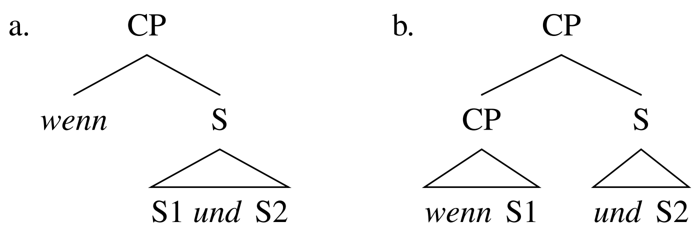
To see this, consider the schematic representation in (15). Suppose we have a quantificational subject Q_i and/or a Negation *Neg* within the first conjunct of a VL-initial AC. By assumption, the second conjunct *S* attaches sentence-externally, i.e., it adjoins to CP. To bind the pronoun pro_i in the second conjunct, Q_i needs to c-command it; to c-command it, Q_i needs to raise (covertly) out of the *if*-clause, and attach to the highest CP node in (15). This, however, is impossible, for we know since the work of Ross (1967) that adverbial clauses —in especially, *if*-clauses— are islands for movement (with the notable exception of indefinites, see inter alia Reinhart (1997), Kratzer (1998) for discussion). Similarly, the negation *Neg*, being an adjunct to VP, and thus buried within the *if*-clause, can not c-command the second conjunct, which is (by assumption) a necessary condition to get scope over the coordinating conjunction *and*.

(15)


In this section, I introduced the phenomenon of Asymmetric Coordination (AC) in German, and argued that V1/V2-initial instances of AC systematically differ from VL-initial ones in two important respects: Whereas in V1/V2-initial AC negation may have scope over the whole coordination and quantificational subjects in the first conjunct may bind pronouns in the second conjunct, this is only marginally possible in VL-initial AC, if at all. To account for the difference in behavior, I stipulated that in the case of V1/V2-initial AC, the second conjunct adjoins sentence-internally (i.e., to VP), whereas it adjoins sentence-externally (i.e., to CP) in the case of VL-initial AC, see (15). If this analysis is on the right track, then we have established at least one case of coordination —namely AC 'within' an *if*-clause—, where the coordinate structure can not be straightforwardly reduced to the simpler structure *if S1, then S2*.

3 A Paradoxon and a Preliminary Solution

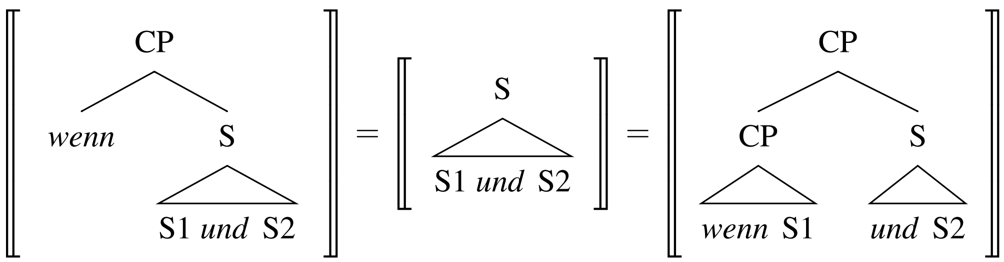
However, if the conclusions drawn in the last section are basically correct, then we seem to end up with some kind of paradoxon. Here it is: From a semantic point of view, the two conjuncts in a VL-initial AC are understood as a complex condition on the truth of the consequent (which relates to one of the core characteristics of AC, its 'fusioning' semantics); therefore, given a transparent syntax/semantics interface, we do expect *if* to have wide syntactic scope with respect to *and*, i.e., we expect an underlying syntactic structure like the one in (16-a).

(16)


On the other hand, we argued in detail in the previous section that there is good empirical evidence from negation and binding data that the second conjunct in fact attaches to the *if*-clause as a whole; seen from this perspective the underlying structure is the one with wide-scope *and* in (17-b). VL-initial Asymmetric Coordination thus seems to exhibit a genuin mismatch between syntactic structure on the one hand, and semantic interpretation on the other.

3.1 A Preliminary Solution

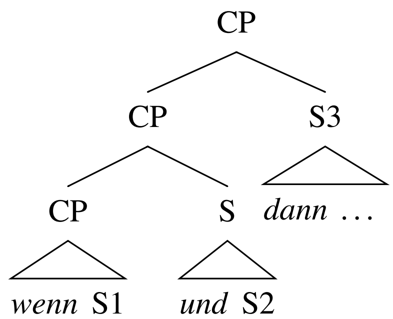
The question then is: Is there any straightforward way to resolve this paradoxon? I think there is. To understand what's going on here, let's have a look at a quote from Kratzer (1991a) who states that "[...] the history of the conditional is the story of a syntactic mistake. There is no two-place *if* ... *then* connective in the logical forms of natural languages. *If*-clauses are devices for restricting the domains of various operators." One way of interpreting this quote in a consistent manner —though not necessarily the only one— is to assume that *if* is semantically vacuous, its sole function being to syntactically indicate (part of) the restriction of a modal operator in the matrix clause. This is essentially to say that *if* simply denotes the identity function $\lambda p.p$ on propositions. Then, of course, our paradoxon vanishes into thin air, since (17) holds.

(17) 

Now that we have found such a simple solution to our paradoxon the impression might evolve that the supposed paradoxon probably wasn't such a serious problem in the first place. Let me take some time to show that it in fact was (and still is) by considering alternative approaches to the semantics of the conditional and by illustrating how they cope with this problem.

The Generalized Quantifier Analysis. One (prima facie) reasonable way of construing the semantics of *if* is certainly to consider *if*-clauses as generalized quantifiers over propositions. In such an approach we can model *if* as relating two propositions —p, its syntactic complement, and q, the matrix clause—, stating that for each R-accessible world w' if p holds in w', then q certainly does, too, see (18-a). Let's abbreviate the semantics of *if* with $\lambda p \lambda q.\Box(p)(q)$.

(18) a. $[\![wenn]\!]^w = \lambda p \lambda q \forall w'[wRw' \wedge p(w') \rightarrow q(w')] =: \lambda p \lambda q.\Box(p)(q)$

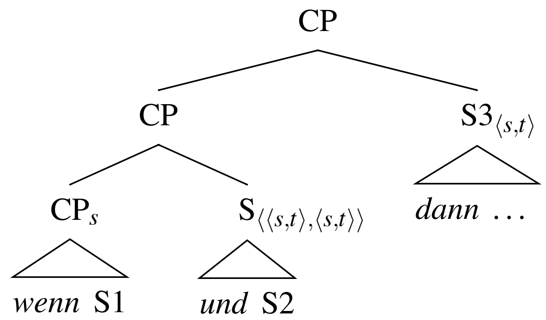
b. 

This semantics copes very well with simple conditionals (as long as there is no overt modal within the matrix clause). If we try to interpret the syntactic structure in (18-b), it turns out, however, that this approach quickly pushes to its limits: Since $[\![if]\!] = \lambda p \lambda q.\Box(p)(q)$, we have $[\![if\ S1]\!] = \lambda q.\Box([\![S1]\!])(q)$, which is a function from propositions to propositions. Now, given that the standard semantics of *and* is essentially something like $\lambda p \lambda q.(p \wedge q)$, we furthermore have that $[\![und\ S2]\!] = \lambda q.([\![S2]\!] \wedge q)$, i.e., another function from propositions to propositions. If we now try to compute the semantics of the coordinate structure *if S1 and S2*, we seem to be stuck, for neither daughter can take the other as an argument —both are of type $\langle\langle s,t\rangle,\langle s,t\rangle\rangle$. The only way to end up with a denotation is by interpreting the coordinate structure via generalized conjunction, which results in $\lambda q(\Box([\![S1]\!])(q) \wedge ([\![S2]\!] \wedge q))$. If we apply this result to the denotation of the matrix clause, we finally end up with the following truth conditions for (18-b): $\Box([\![S1]\!])([\![S3]\!]) \wedge ([\![S2]\!] \wedge [\![S3]\!])$. This is, of course, complete nonsense, since it asserts —inter alia— that S3 is true, no matter whether S1 and/or S2 is true. What we should in fact end up with is rather something like $\Box([\![S1]\!] \wedge [\![S2]\!])([\![S3]\!])$. This shows that the generalized quantifier analysis of *if*-clauses is incompatibel with our syntactic analysis of VL-initial AC.

The Referential Analysis. Since there is strong independent evidence challenging the generalized quantifier approach to *if*-clauses anyway (see, e.g., Lewis (1975), Kratzer (1978)), this result might have been expected. Let's therefore have a look at a more recent approach to the semantics of *if*-clauses. In trying to assimilate the semantics of *if*-clauses to the semantics of definite descriptions, Schlenker (2004) proposes to analyze *if*-clauses as referring to (pluralities of) possible worlds, the relation between matrix and subordinate clause being one of predication. In this approach, the complementizer *if* is construed as a choice function f_w choosing from its syntactic and semantic complement —which is a proposition p— that (plurality of) world(s) w' which is closest to the actual world, see the simplifying definition in (19-a). If q is the proposition denoted by the matrix clause, then *if p, then q* is true in w, iff $q(w')$ holds.

(19) a. $[\![wenn]\!]^w = \lambda p.f_w(p)$, where $f_w(p) \in p$

b.



Does the referential analysis cope better than the generalized quantifier analysis with respect to the interpretation of the structure in (19-b)? Not really. In fact, the problems are quite similar: By assumption, *[wenn S1]* denotes a world w', i.e., an object of type s. Its sister node *[und S2]* however denotes, as we saw above, a function from propositions (sets of possible worlds) to propositions, namely $\lambda q.([\![S2]\!] \wedge q)$. Therefore, we end up —again— in a type mismatch. Though we could try to fiddle around with types (e.g., type raising of w' to $\lambda q.q(w')$), this leads to nowhere. Another way to tackle the problem could be to question one of the premises of this argument, for it is probably too simplistic to assume that there is exactly one possible world in p that is closest to w. A more reasonable assumption is that this is a plurality of worlds. A plurality of worlds, however, could be construed as a set of worlds $p' \subseteq p$, i.e., as a proposition. This in turn is, at least as far as types are concerned, an adequate input to $\lambda q.([\![S2]\!] \wedge q)$, which then results in $[\![S2]\!] \wedge p'$. What we have lost now, however, is one of the crucial characteristics of the approach pursued by Schlenker, namely the construal of the matrix clause/subordinate clause relation as a predication structure $p(w')$. To maintain this analysis, we could assume that the matrix clause denotes a set of propositions (which is not that far-fetched, since this models a set of pluralities in the system sketched above) rather than a proposition. However, if the matrix clause S3 does, then the second conjunct S2 should do so, too —which, again, would lead us into a type conflict. To conclude this little excursion: There may be ways to get the referential analysis to work in the face of (19-b) by elaborating on the mereology of possible worlds; to me, however, it is not obvious how to do this.

3.2 Another Problem: Distributivity

We could simply stop here now, and conclude that the syntax of VL-initial AC can be taken as additional (indirect) evidence for the Lewis/Kratzer approach to the semantics of conditionals which states that "*If*-clauses are [just syntactic, I.R.] devices for restricting the domains of various operators." There is one problem, though, with my rather narrow interpretation of Kratzer's quote: Suppose, as we did above, that *if* is in fact semantically vacuous, i.e., that it denotes the identity function $\lambda p.p$ on propositions. Given that (21) is, like (20), a case of (some kind of) CP-coordination, then we expect (20) and (21) to be semantically equivalent.

(20) Wenn du nach Hause kommst und der Gerichtsvollzieher steht vor der Tür,
If you back home come and the bailiff stands at the door,
'If you get home, and the bailiff is standing at the door, ...'

(21) Wenn du nach Hause kommst und wenn der Gerichtsvollzieher vor der Tür steht,
If you back home come and if the bailiff stands at the door,
'If you get home, and if the bailiff is standing at the door, ...'

But, of course, they are not. Suppose that the conditionals both end in something like *[...] then you've got a problem.* Then it seems pretty obvious that (21) has —in addition— a distributive reading, whereas (20) has not. In its distributive reading (21) states that the subject of the matrix clause has a problem, if he gets home —whether or not the bailiff is standing at the front door (maybe there is an ongoing conflict with his wife), and, of course, he has a problem, if the bailiff is standing at the front door (whether or not there is an ongoing conflict with his wife). (20) lacks this reading. In (22) the distributive reading even seems to be the only one available.

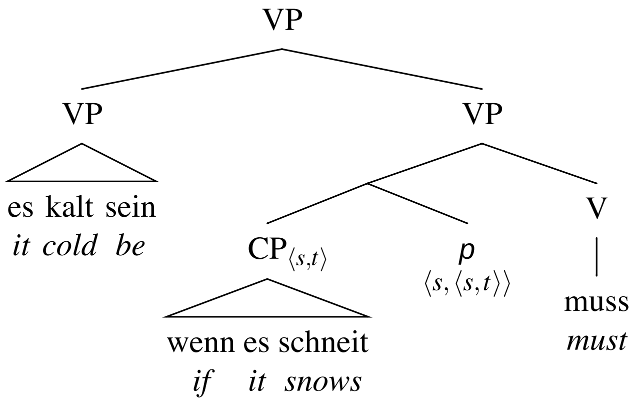
(22) Wenn er reingeht und wenn er rauskommt, muss er am Türsteher vorbei.
If he goes in and if he comes out, must he the bouncer pass
'If/When he goes in and if/when he comes out, he has to pass the bouncer.'

We therefore need some straightforward way to systematically distinguish structures of the form *if S1 and if S2* from structures of the form *if S1 and S2*. Since it may very well be that this is already a property of existing analyzes within the Lewis/Kratzer approach to conditionals, let's first have a look at two prominent representatives who are reasonably explicit about the syntax/semantics interface, namely Von Stechow (2004) and Von Fintel (1994).

3.3 Von Stechow (2004): A Movement Approach

Von Stechow's approach to the syntax of conditionals is a movement approach. He starts from the assumption that in a conditional like *Wenn es schneit, (dann) muss es kalt sein* ("if it snows, it must be cold") the subordinate clause is actually base-generated as a sister to the modal's restriction p —see the sketch in (23)— in which position it is also interpreted. Overt word order is deduced by moving the *if*-clause to a sentence-peripheral position.

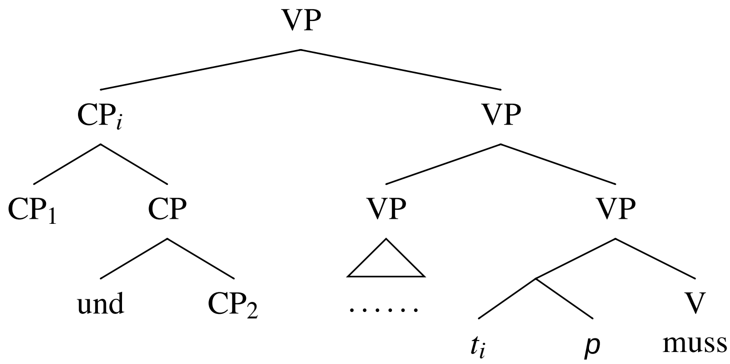
(23)



The compositional interpretation proceeds as follows: The modal's restriction p is a variable of type 'modal base' (i.e., type $\langle s, \langle s,t \rangle \rangle$) picking up in context the modal background (epistemic, deontic, buletic etc.) relative to which the modal *muss* ("must") needs to be interpreted. Suppose that the *if*-clause *wenn es schneit* ("if it snows") denotes the proposition p (type $\langle s,t \rangle$), then the *if*-clause and the modal's restriction p combine via a rule of generalized conjunction which results in the 'complex modal base' $\lambda w(p \wedge \mathsf{p}(w))$. Let q be the denotation of the VP *es kalt sein* ("it cold be"), then the conditional *wenn es schneit, dann muss es kalt sein* is interpreted as the tripartite structure $muss(\lambda w(p \wedge \mathsf{p}(w)))(q)$ which, roughly speaking, states that in a given world @ the proposition $(p \wedge \mathsf{p}(@))$ is a subset of q. In other words: Each possible world which is epistemically accessible (from @), and in which it snows, is a world in which it is cold. This is the (somewhat simplified) standard semantics in the Lewis/Kratzer approach.

Distributive "and". Distributive readings can be derived in von Stechow's analysis on the basis of two (quite uncontroversial) assumptions. First, we need to stipulate a distributive reading for the coordinate conjunction *and*, namely $\lambda p_2 \lambda p_1 \lambda Q.(Q(p_1) \wedge Q(p_2))$. Second, we need to assume that the coordinate structure is not interpreted in situ, but moves to a sentence-peripheral position, see the skeleton of the resulting syntactic structure depicted in (24-a). The latter assumption is in fact type-driven, and thus an immediate consequence of the first one.

(24) a.



b. $muss(\lambda w(p_1 \wedge \mathsf{p}(w)))(q) \wedge muss(\lambda w(p_2 \wedge \mathsf{p}(w)))(q)$

Without having to go into details, it is evident that (24-a) derives a distributive interpretation: The matrix clause denotes a property of propositions, $\lambda r.muss(\lambda w(r \wedge \mathsf{p}(w)))(q)$, which functions as an argument to the coordinate structure $\lambda Q.(Q(p_1) \wedge Q(p_2))$, see (24-b).

Are we done? What we did show is that we can derive distributive readings within the proposed Lewis/Kratzer approach without having to manipulate the semantics of *if*. What we didn't show, however, is that we are able to systematically distinguish structures of the form *if S1 and if S2* from structures of the form *if S1 and S2*. In fact, it seems that we can not, for there is no straightforward way to prevent distributive *and* to also apply in the case of *if S1 and S2*, and to generate a distributive reading which isn't available. In short: We overgenerate.

Ellipsis. Are there any straightforward alternatives? There may be one: ellipsis. If we can not prevent distributive *and* from overgenerating, we might be better off dropping this assumption and deriving distributive readings from underlying *if S1, ~~then S3,~~ and if S2, then S3* via some kind of leftward deletion. Such an analysis correctly captures the fact that distributive readings necessarily require two *if*'s (as long as we exclude complementizer deletion).

There is, however, a problem with the ellipsis analysis that relates to the distribution of *dann* ("then"). As Iatridou (1991) observes, *then* is impossible in examples like the one in (25). As it turns out, the same seems to be true of cases like the one in (26).

(25) If John is dead or alive, (*then) Bill will find him.

(26) Wenn er reingeht und wenn er rauskommt, (*dann) muss er am Türsteher vorbei.
If he goes in and if he comes out, (*then) must he the bouncer pass
'If/When he goes in and if/when he comes out, he has to pass the bouncer.'

Iatridou (1991) accounts for the contrast in (25) by pointing out that *then* seems to carry the presupposition that its antecedent does not exhaust all conceivable possibilities (which *dead or alive* surely does). With respect to (26) this boils down to the assumption that the antecedent needs to be consistent (i.e., that the intersection of p_1 and p_2 is non-empty). Since the antecedent in (26) is in fact inconsistent, we correctly predict that *dann* is out in (26). However, if we try to derive the distributive interpretation —which is the only one available in (26)— via leftward deletion, then we apparently lose this prediction: In *Wenn er reingeht, ~~dann muss er am Türsteher vorbei~~, und wenn er rauskommt, dann muss er am Türsteher vorbei* each antecedent (being the only one) is, of course, consistent; therefore *dann* should be perfectly fine.

Do *if*-Clauses Move? Another (though a minor) point I'd like to mention here is that it is not evident that *if*-clauses are in fact base-generated as sisters to the modal they restrict. Consider, for example, the binding data in (27). Whereas (27-b) is fine, (27-a) seems pretty bad.

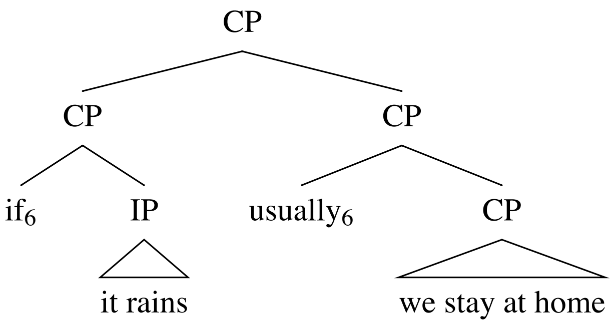
(27) a. ??Wenn er$_i$ recht hat, ist jeder$_i$ zufrieden.
If he$_i$ right is, is everybody$_i$ pleased.
b. Jeder$_i$ ist zufrieden, wenn er$_i$ recht hat.
Everybody$_i$ is pleased, if he$_i$ right is.
'Everybody is pleased, if he is right.'

However, if both (27-a) and (27-b) derive from exactly the same source —and if binding is checked on LF—, the contrast in (27) is quite unexpected. This is immediately accounted for, if we take it that *if*-clauses are base-generated in sentence-peripheral positions, i.e., in [Spec,CP] or as an adjunct to VP (see Bhatt and Pancheva (2006) for further discussion).

3.4 Von Fintel (1994): An In Situ Approach

An analysis along these lines is proposed in Von Fintel (1994). Instead of moving *if*-clauses, his analysis relies on coindexation. Consider, for example, the conditional *If it rains, we usually* *stay at home*. According to Von Fintel (1994) this conditional is assigned the LF in (28-a).

(28) a.



b. $[\![if_6\ p, q]\!]^g = [\![q]\!]^{g'}$, where $g' = g[6 \mapsto g(6) \cap [\![p]\!]]$

In (28-a), *if* is coindexed with a modal operator in the matrix clause, and the conditional is interpreted according to the rule in (28-b). (28-b) essentially states to ignore the *if-clause* for the time being, but to remember to interpret the restriction of the coindexed modal operator as intersecting with the proposition p denoted by the syntactic complement of *if*.

Now, what prediction does this system make concerning the analysis of Asymmetric Coordination, if any? This is in fact hard to tell. The problem is that the rule in (28-b) —as it stands— is set up in such a way that it presupposes that conditionals are ultimately always of the form *[[if$_6$ S1], then S2]*. But as I argued in section 2, this is not the case with VL-initial AC: The syntax underlying this construction has the shape *[[[if$_6$ S1] and S2], then S3]*. This, however, is not an adequate input for the rule in (28-b), in especially the index 6 on the complementizer *if* is not accessible to the rule, for it is too deeply buried within the antecedent clause.

4 A Reinterpretation of von Fintel's Analysis

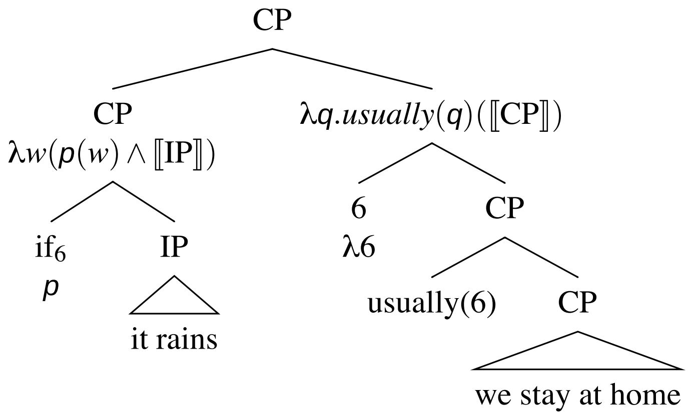
I nevertheless think that von Fintel's analysis is basically on the right track. In this section, I will therefore present a reinterpretation and extension of Fintel's analysis, which is capable of handling both the AC data and the distributivity data in a straightforward way.

4.1 Basic Assumptions

Let me illustrate the analysis I have in mind with von Fintel's example *If it rains, we usually stay at home*. Like von Fintel, I assume that the complementizer *if* is assigned an index i which is of type modal base ($\langle s \langle s,t \rangle \rangle$); and —again following von Fintel (1994)— I furthermore assume that if_i is coindexed with some modal operator in the matrix clause, see (29-a) [next page].

In contrast to von Fintel (1994), however, I take it that the index on *if* —since *if* constitutes the head C of CP— projects up to CP. Here, the index i on CP (i) induces coindexation with the closest modal operator in its c-command domain (which is *usually* in (29-a)), and (ii) adjoins to its sister node, where it functions as a binder index, see Heim and Kratzer (1998) for details. These specific assumptions about the coindexation mechanism enable us to do away with von Fintel's rule (28-b), and to interpret the index on *if* locally, i.e., an indexed complementizer if_i is interpreted as locally introducing a variable $g(i)$ of type modal base. (In the following, I will stick to the convention implicitly introduced above of using sans serif variables $\mathsf{p},\mathsf{q},\mathsf{r}$ as a more reader-friendly notational variant for $g(i), g(j), g(k)$.) The interpretation of (29-a) then is straightforward: if_6 combines with its syntactic complement via 'generalized conjunction', see (30). The *if*-clause thus denotes the complex modal base $\lambda w(\mathsf{p}(w) \wedge [\![\textit{it rains}]\!])$.

(29) a.



b. $[\![(29\text{-a})]\!]^g = \mathit{usually}(\lambda w.(p(w) \wedge \mathit{that\ it\ rains}))(\mathit{that\ we\ stay\ at\ home})$

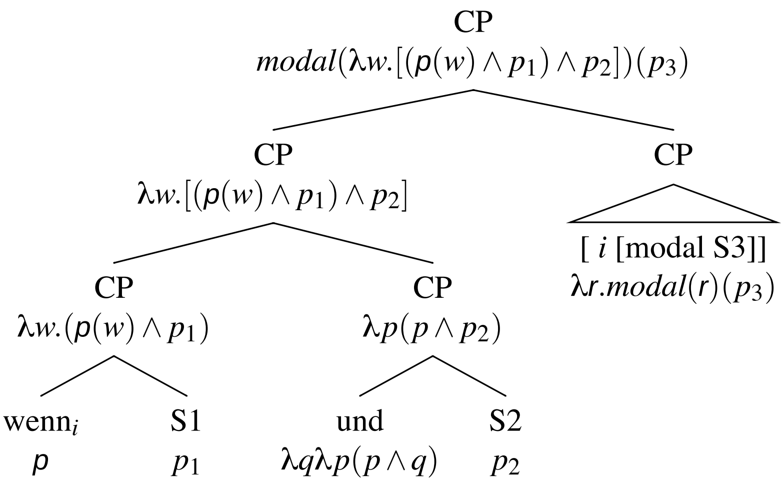
(30) GENERALIZED CONJUNCTION: If α is a node with daughters γ, δ; γ is of type $\langle s, \sigma \rangle$ and δ is of type σ (σ a conjoinable type), then $[\![\alpha]\!] = \lambda w([\![\gamma]\!](w) \wedge [\![\delta]\!])$.

Having interpreted the adjoined binder index 6, the matrix clause denotes a property of modal bases, namely $\lambda q.\mathit{usually}(q)([\![\mathit{we\ stay\ at\ home}]\!])$, which we can apply to the semantics of the *if*-clause. We finally end up with the correct representation in (30-b).

4.2 Asymmetric Coordination

The crucial idea in this reinterpretation of von Fintel's analysis is that *if* is not completely vacuous after all: *if* —or rather the index on *if* (keep in mind the possibility of V1 conditionals like *Regnet es, dann bleiben wir normalerweise zu Hause* in German)— introduces a variable p picking up a modal background in the context. This assumption is the cornerstone for the interpretation of VL-initial AC. To see this, consider the schematic representation of a VL-initial AC in (31), annotated with its compositional semantic interpretation.

(31)



As in the simple example, *if* is assigned an index i which is locally interpreted as a variable p ranging over objects of type modal base. The index i projects by assumption to the maximal projection CP. Since the second conjunct *and S2* adjoins (again, by assumption) to CP, the index i is copied to the CP node immediately dominating both conjuncts (copying is what adjunction is all about). This index i is then coindexed with the closest modal operator in its c-command domain, it adjoins to its sister node, and binds the restriction of the modal operator it is coindexed with. The matrix clause thus denotes (again) a property of modal bases, $\lambda r.modal(r)(p_3)$.

The by far more interesting part, however, is what is going on within the coordinate structure. As before, the *if*-clause is interpreted as a complex modal base $\lambda w.(p(w) \wedge p_1)$ via generalized conjunction. The second conjunct, however, denotes a function from propositions to propositions, $\lambda p(p \wedge p_2)$, i.e., the denotation of the *if*-clause does not exactly fit the type of argument the second conjunct is asking for. This is not a serious problem though, for we already capitalized on the property of modal bases p in the definition of generalized conjunction that we can shift their semantic type $\langle s, \langle s,t \rangle\rangle$ to the type $\langle s,t \rangle$ of propositions by applying some world variable w, executing some operation (conjunction or functional application), and abstracting over w again afterwards. This derives the even more complex modal base $\lambda w.[(p(w) \wedge p_1) \wedge p_2]$, which is then semantically reconstructed into the restriction of the coindexed modal operator, see the representation $modal(\lambda w.[(p(w) \wedge p_1) \wedge p_2])(p_3)$ in (31).

Interpretation of AC is, thus, pretty straightforward. In fact, the interpretational process is essentially the same as with simple *if*-clauses: In each case a (complex) modal base is simply conjoined with a proposition, resulting in a(nother) complex modal base. The sole difference is that this interpretational process is mediated by the rule of generalized conjunction in the case of simple *if*-clauses, whereas it is hard-wired in the semantics of *and* in the case of AC.

4.3 Distributivity

What about distributivity? Is it possible to derive distributive readings within this approach without falling back on ellipsis? And if so, do we avoid to predict distributive readings in the case of AC? Let's focus on the former question first: In fact we can derive distributive readings —along the same lines as we did within von Stechow's analysis—, namely by stipulating a distributive variant of *and*: $und_D = \lambda s \lambda r \lambda Q.[Q(r) \wedge Q(s)]$. This time, however, *and* distributes over (complex) modal bases rather than propositions, see (32-a) for relevant details. What we end up with, is (32-b), which seems to be a good approximation to the distributive reading.

(32) a.
- CP_i — $\lambda Q.[Q(\lambda w[p(w) \wedge p_1]) \wedge Q(\lambda w[q(w) \wedge p_2])]$
  - CP_i — $\lambda w.(p(w) \wedge p_1)$
    - wenn_i — p
    - S1 — p_1
  - &P — $\lambda r \lambda Q.[Q(r) \wedge Q(\lambda w.q(w) \wedge p_2)]$
    - und_D — $\lambda s \lambda r \lambda Q.[Q(r) \wedge Q(s)]$
    - CP_j — $\lambda w.(q(w) \wedge p_2)$
      - wenn_j — q
      - S2 — p_2

b. $modal(\lambda w[p(w) \wedge p_1])(q) \wedge modal(\lambda w[q(w) \wedge p_2])(q)$

Can we avoid distributive readings in the case of AC? It seems that we can. In fact, this just follows from the syntax of AC. Consider again (32-a). In (32-a), we have a coordination of two full-fledged *if*-clauses *[[if$_i$ S1] [and [if$_j$ S2]]]*, in particular the second conjunct is headed by the complementizer *if$_j$*. The crucial characteristic of AC, however, is that the second conjunct is not headed by a complementizer (the finite predicate is in V1- or V2-position), i.e., its underlying structure is something like *[[if$_i$ S1] [and S2]]*. Therefore the complement of *and* is of type proposition rather than modal base, which conflicts with the semantics of distributive *and*; therefore distributive *and* is not applicable, and a distributive reading can not be derived.[4]

Finally, the non-distributive reading of structures like the one in (32-a) is derived by simply not indexing the complementizer *if* in the second conjunct: If *if* is not indexed, it is simply ignored by the denotation function $[\![\cdot]\!]$, and the derivation proceeds as it does in the case of AC.

4.4 On Multiple Modal Bases

This way of setting up the syntax and semantics of conditionals thus seems to cope very well with the problems raised by VL-initial AC as well as with matters concerning distributivity. It comes as a price, though. Consider again (32), in especially (32-b). In distributive readings, the two *if*'s are (by assumption) not necessarily coindexed, and, as a consequence, they typically introduce different variables, p and q, ranging over modal bases. Therefore, it is, at least in principle, conceivable that they pick up different modal backgrounds in context. As far as I can see, however, distributive readings sytematically relate to the same modal base.

But, actually, I do not think that this problem is really that serious. (i) In distributive readings the variables p and q relate to the same (Stalnaker) context c. (ii) Both relate to the same modal operator in the matrix clause. (iii) If Kratzer (1991b) is right, then modal operators do not only refer to a modal base, but to a modal base (circumstantial or epistemic) and an ordering source (deontic, buletic etc.). From (ii) and (iii) it follows that there is no variation with respect to the ordering source, so chances are good that there neither is with respect to the modal bases.

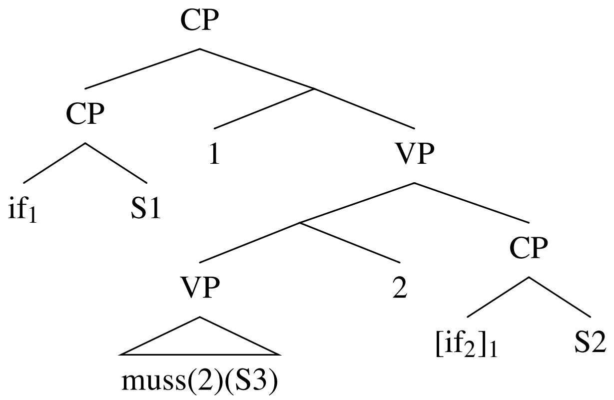
Moreover, it seems that the presence of multiple modal bases comes in handy in other cases, like the one in (33). (33) consists of two *if*-clauses —one sentence-initial (*S1 = wenn Stoiber und Öttinger recht haben*), the other sentence-final (*S2 = wenn die Gesundheitsreform doch noch durchgeht*)— and a matrix clause (*S3 = die Bayern und die BWer müssen die Zeche zahlen*). Its interpretation can be schematically represented as $(S1 \rightarrow (S2 \rightarrow S3))$.

(33) Wenn Stoiber und Öttinger recht haben, dann müssen die Bayern und die BWer die
If Stoiber and Öttinger right are, then must the Bavarians and the BWer the
Zeche zahlen, wenn/falls die Gesundheitsreform doch noch durchgeht.
bill pay, if the health reform PART still passes
'If Stoiber and Öttinger are right, then it is the Bavarians and the BWer that have to pay the bill, if the health reform does in fact pass.'

How do we arrive at this interpretation? Consider the Logical Form (34) [next page] assigned to (33). In (34), the complementizer *if* belonging to S1 is assigned the index 1, and the complementizer *if* belonging to S2 is assigned the index 2. The index 1 (after projecting up to CP) adjoins to its sister node, and triggers coindexation with the closest modal operator within its c-command domain. This time, however, the closest modal operator is not the modal verb *must*, but the complementizer *if* that belongs to the sentence-final *if*-clause S2 (that is attached to the VP of the matrix clause). This has the effect that the denotation of the sentence-initial *if*-clause S1, $\lambda w(p(w) \wedge p_1)$, is semantically (re)constructed into the position of if_2. As a consequence, the sentence-final *if*-clause S2 denotes the complex modal base $\lambda w((p(w) \wedge p_1) \wedge p_2)$. Since the index 2 binds the restriction of the modal verb *must*, the denotation of S2 is semantically

[4]One may think that it is nevertheless possible to derive a distributive reading by taking recourse to a lower type distributive *and*, namely the one distributing over propositions rather than modal bases. If we do so, we derive something like $\lambda w \lambda Q[Q(p(w) \wedge p_1) \wedge Q(p_2)]$ as the representation of the coordinate structure; the matrix clause —a property of modal bases $(\lambda r.modal(r)(q))$— is, however, not a suitable argument to this function.

(34)



(re)constructed into the restriction of *must*, resulting in $must(\lambda w((p(w) \wedge p_1) \wedge p_2))(q)$. If we take into account that *and*, at the end of the day, needs to be defined in an asymmetric fashion (since it is dynamically updating a modal base), this is exactly the interpretation we are after. In deriving this interpretation, we made, however, crucial use of the presence of multiple modal bases, since this is exactly what enabled us to do recursive chain formation.

5 Summary

In this paper, I argued on empirical grounds that VL-initial Asymmetric Coordination in German can not be reduced to a syntactic structure of the form *[if S1, then S2]*, but rather needs to be analyzed as adjunction to the *if*-clause, i.e., along the structure *[[if S1] and S2], then S3]*. This conclusion gave rise to a mismatch between syntactic structure and semantic interpretation which we resolved —essentially following the Lewis/Kratzer approach to the semantics of conditionals— by assuming that the complementizer *if* is semantically vacuous. It turned out, however, that this assumption leads to considerable overgeneration, for it wrongly predicts the existence of distributive readings in the case of Asymmetric Coordination. Therefore, in the last part of the paper, building on work done by Von Fintel (1994), a compositional semantics for conditionals has been developed that pursues the idea that (indexed) *if* introduces a variable into the interpretational process that ranges over objects of type modal base, and picks up a modal background in the actual context. Though this analysis assigns a non-vacuous semantics to *if*, it is still compatible with the syntax of Asymmetric Coordination, and it furthermore avoids the generation of non-existent distributive readings. Last but not least, it allows for chain composition, which forms the basis of our account of 'multi-conditional' sentences.

References

Bhatt, R. and Pancheva, R.: 2006, Conditionals, *in* M. Everaert and H. van Riemsdijk (eds), *The Blackwell Companion to Syntax, Volume I*, Blackwell Handbooks in Linguistics, Blackwell Publishing, Oxford, pp. 638–687.

Büring, D. and Hartmann, K.: 1998, Asymmetrische Koordination, *Linguistische Berichte* **174**, 172–201.

Fortmann, C.: 2005, Die Lücken im Bild von der *Subjektlücken*-Konstruktion, *Linguistische Berichte* **204**, 441–476.

Frank, A.: 2002, A (discourse) functional analysis of asymmetric coordination, *in* M. Butt and T. King (eds), *Proceedings of the LFG02 Conference*, pp. 174–196.
URL: *csli-publications.stanford.edu/LFG/7/lfg02frank-num.pdf*

Heim, I. and Kratzer, A.: 1998, *Semantics in Generative Grammar*, Blackwell, Oxford.

Höhle, T. N.: 1983, Subjektlücken in Koordinationen. Ms., Universität Tübingen.

Höhle, T. N.: 1990, Assumptions about asymmetric coordination in German, *in* J. Mascaró and M. Nespor (eds), *Grammar in Progress. Glow Essays for Henk van Riemsdijk*, Foris, Dordrecht, pp. 221–235.

Iatridou, S.: 1991, *Topics in Conditionals*, PhD thesis, MIT, Cambridge, Mass.

Kratzer, A.: 1978, *Semantik der Rede: Kontexttheorie – Modalwörter – Konditionalsätze*, Scriptor, Königstein/Ts.

Kratzer, A.: 1991a, Conditionals, *in* Von Stechow and Wunderlich (1991), pp. 651–656.

Kratzer, A.: 1991b, Modality, *in* Von Stechow and Wunderlich (1991), pp. 639–650.

Kratzer, A.: 1998, Scope or pseudoscope? Are there wide-scope indefinites?, *in* S. Rothstein (ed.), *Events and Grammar*, Kluwer, Dordrecht, pp. 163–196.

Lewis, D.: 1975, Adverbs of quantification, *in* E. L. Keenan (ed.), *Formal Semantics of Natural Language*, Cup, Cambridge, pp. 3–15.

Reich, I.: 2007a, Asymmetrische Koordination im Deutschen. Ms., Universität Tübingen.

Reich, I.: 2007b, From discourse to 'odd coordinations' – On asymmetric coordination and subject gaps in German, *in* C. Fabricius-Hansen and W. Ramm (eds), *'Subordination' vs. 'Coordination' in Sentence and Text*, John Benjamins. [In press.]

Reinhart, T.: 1997, Quantifier scope: How labor is divided between QR and choice functions, *Linguistics and Philosophy* **20**, 335–397.

Ross, J. R.: 1967, *Constraints on Variables in Syntax*, PhD thesis, MIT.

Schlenker, P.: 2004, Conditionals as definite descriptions (a referential analysis), *Research on Language and Computation* **1**, 417–462.

Von Fintel, K.: 1994, *Restrictions on Quantifier Domains*, PhD thesis, University of Massachusetts.

Von Stechow, A.: 2004, Schritte zur Satzsemantik. Ms., Universität Tübingen.

Von Stechow, A. and Wunderlich, D. (eds): 1991, *Semantik – Ein internationales Handbuch zeitgenössischer Forschung. Semantics – An International Handbook of Contemporary Research*, De Gruyter, Berlin.

Wunderlich, D.: 1988, Some problems of coordination in German, *in* U. Reyle and C. Rohrer (eds), *Natural Language Parsing and Linguistic Theories*, Reidel, Dordrecht, pp. 289–316.