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Semantic Universals and Universal Semantics

Contents

Conditionals and Unconditionals:
Cross-linguistic and Logical Aspects

Dietmar Zaefferer

Institut für Deutsche Philologie
Universität München
Schellingstr. 3
D-8000 München 40

Although conditional sentences are important in
all languages, and although their 'logic' has been
thoroughly, if inconclusively, investigated by
philosophers, our knowledge and understanding of
them in the languages of the world is very poor.
(Palmer 1986: 188)

0. Introduction

The main purpose of this paper is to argue against the sceptic tenor of its anti-motto, the quotation of Palmer's, and for the continuation of a love story called 'typology meets formal semantics' that has started its delicate course some time ago at the 1983 Stanford symposium on conditionals, and that still needs a lot of encouragement in order to blossom. I think that it deserves this encouragement because it promises substantial progress both for the research in typology and linguistic universals and for formal semantics and language-oriented logics. I will try to argue for this using the example of conditional forms and functions and their relatives on the one hand, and a theory of conditionals inspired by ideas of Barwise, Gärdenfors, Heim, Kratzer, Lewis and Rott[1] on the other. Whereas this paper emphasizes the typological data and presents the theory only in rough outline, a (partially overlapping) companion paper to the present one (Zaefferer 1990) spells out the theory in more detail after only a short summary of the typological findings. To get started, some terminological clarifications will be proposed and some methodological principles will be stated.

0.1. Terminological clarifications

First: What do I understand by a conditional? A conditional or more explicitly a *conditional form* is a grammatical structure or construction that encodes a conditional function as its primary purpose. And what is a conditional function? A *conditional function* is something that conditionalizes any proposition q, i.e., that converts q into the

proposition that something, normally the holding of some given proposition p, is (in a way) sufficient for the holding of q.

I will call the proposition that is to be conditionalized the *consequent*, the conditionalizing proposition the *antecedent*, and the result of the conditionalization the *c-proposition*, reserving these Latin terms for the semantic level. On the syntactic level, I will use the Greek terms *apodosis* and *protasis*: 'apodosis' for the unmodified (but sometimes marked) superordinate linguistic form, 'protasis' for the modifying subordinate form, and *c-construction* for the combination of the two. Please note that, taken this way, most of the time, the apodosis encodes just the consequent, but the protasis does not only encode the antecedent, but also the conditional relation it stands in with respect to the consequent, in other words it normally encodes the whole conditional function. The division of labor among the three linguistic forms varies however from language to language and from construction to construction. Note further that in addition both protasis and apodosis can encode quantification over various consequents with respect to various antecedents.

Second: What is an unconditional? An unconditional or more explicitly an *unconditional form* is a grammatical structure or construction that encodes an unconditional function as its primary purpose. And what is an unconditional function? An *unconditional function* is something that deconditionalizes any proposition q, i.e., that converts q into the proposition that the holding of any one of a given set of propositions P is (in a way) sufficient for the holding of q, where P exhausts the set of options that are taken into consideration at the present state of the discourse, in other words the proposition that the holding of q is unconditional on the question which one of the members of P happens to be true, where it is implicated, if not tautological, that at least one of them in fact is true.

Sentences (1) and (2) are examples of an English conditional and unconditional form, respectively.

(1)   If a cangaroo loses its tail, it topples over.
(2)   Whether you like it or not, I won't permit smoking here.

After these terminological remarks, I would like to give a cross-linguistc overview both of the domain of conditional forms and their relatives and of the conceptual field of the conditional functions and related concepts.

Why? Because it is a well-known universal tendency that polysemy is more widespread than homonymy, i.e., identical forms tend to encode related concepts. And this rule can be generalized:

(P1)   Identical or related forms tend to encode related concepts,

where relatedness of form is defined as phonological and structural similarity, and this in turn as number of common features, and where relatedness of concepts is defined as either as similarity again (cf. metaphors) or as contiguity, especially in the subconcept-superconcept hierarchy (cf. metonymy).

Conceptual relatedness need not be universal, but there must be a core domain of universally related concepts in the conceptual fields of all linguistic communities. Which conceptual fields are in this universal domain, and what is their universal structure? If our principle (P1) is correct, then cross-linguistically recurring patterns of relatedness of forms indicate relatedness of the encoded concepts and make the latter good candidates for universally related concepts. Let me state this as principle (P2):

(P2)   Cross-linguistically recurring patterns of formal and conceptual
         relatedness indicate universality of the conceptual relations.

Concepts like the ones encoded by logical constants, and the relations among them are of course top candidates for universal conceptual structures,[2] but it is also important to see how logical concepts link up with non-logical ones, and here recurring relatedness patterns in both form and function offer an important window on the common denominator of human conceptual systems.

Therefore in order to understand fully what conditionalization is, it is helpful, I submit, to look at it in the context of universally related concepts. So the working hypothesis for the following overview is a specialization of principle (P1):

(P1c)   Relatives of conditional forms tend to encode concepts that are relatives of
         conditional functions.

1. Conditional forms and their relatives across languages
1.1. Conditional forms in English

Conditional functions are proposition modifiers, consequently, conditional forms are sentence adverbials.[3] Therefore, like other sentence adverbials, they can be of one of the following types:

(a)   Lexical adverbials, i.e., adverbs;

(b)   Phrasal adverbials, i.e., prepositional phrases and other sub-clausal constructions; or

(c)   Sentential adverbials, i.e., adverbial clauses.

An adverbial clause can itself be complex, especially can it take the form of another conditional construction, witness (1):

(1)   If you open the radiator if the engine is hot, you might get burned.

This shows that conditionalization is not an exceptional root sentence phenomenon, but a regular recursive one, like many other grammatical phenomena.

Lexical conditionals in English are restricted to a few words. Let's examine three examples:

(2)   *Then* we are really in trouble.

(3)   Mathematical problems are *sometimes* very hard to solve.

(4)   Swimming is not *always* easy.

To see what makes *then*, *sometimes*, and *always* lexical conditionals, consider the following three sentences:

(5)   *Under these circumstances* we are really in trouble.

(6)   Mathematical problems are *in some cases* very hard to solve.

(7)   Swimming is not *under all conditions* easy.

And if these examples of phrasal conditionals are not convincing either, consider the following clausal ones:

(8)   *If all our money is lost* we are really in trouble.

(9)   Mathematical problems are very hard to solve *when they are posed by a malevolent expert.*

(10)   Swimming is not easy *if you haven't practiced for a long while.*

Now it is easy to see that not only (8) - (10), but also (2) - (7) involve genuine conditionals. First imagine a context like the one created by (11):

(11)   I'm afraid all our money is lost.

Clearly, in such a context, (2), (5) and (8) are local paraphrases of each other. Furthermore, putting special contexts aside, it is obvious that (3) and (6) follow from (9), as well as (4) and (7) follow from (10), and it is possible to cook up clausal *if*-paraphrases also for examples (3) and (4).

Now let's have a closer look at the *lexical conditionals*. All of them are structure words, i.e., they encode structural, and not lexical meaning. *Then* is an anaphoric proform that refers to a previously mentioned proposition and puts it into the role of an antecedent, i.e., a form that encodes a condition. Its meaning can therefore be analysed into two parts: the anaphorical pointer at some given proposition, and the two-place conditional function, i.e., the function that takes this proposition and converts it into a one-place conditional function.

Sometimes and *always*, on the other hand, do not refer at all, they are adverbs of quantification that in our examples quantify not over times, but over conditions. Therefore their meaning can be analysed as consisting of two different parts, a quantifier and a sortal indication of what is quantified over, namely conditional functions ('times' or 'ways').

All examples for *phrasal conditionals* given above were prepositional phrases with the same anaphoric and quantificational properties as just discussed in the context of the lexical conditionals, except that they are more specific than these since they distinguish between cases, conditions, and circumstances. But like the lexical conditionals, they do not spell out the conditions they are alluding at, and this does not come as a surprise, since conditions are propositions in a special role, and propositions are normally encoded by clauses, so the normal, full and independent expression of a condition is a clausal conditional.

Clausal conditionals are exemplified in (8) - (10) above. In (8) the protasis is 'If all our money is lost', epressing the conditional function with the antecedent that all our money is lost, the apodosis is 'we are really in trouble', expressing the consequent proposition that we are really in trouble, (8) itself is the c-construction and the c-proposition expressed by it is the proposition that the truth of the antecedent, namely that all our money is lost is sufficient for or requires the truth of the consequent, i.e., that we are really in trouble, in other words whatever circumstances might make it true that all our money is lost also make it true that we are really in trouble. And similarly for (9) and (10).

We haven't looked yet at clausal counterparts for (3) and (4), the quantified examples, but they are easy to construct, cf. (12) and (13).

(12)   Sometimes if you want to take a subway train it is already full.

(13)   If something is very expensive, it is not always also very good.

The examples show that both quantifying protases and quantifiying apodoses exist. The semantic effect is in both cases the same, since what is quantified over are cases of the conditional relation, i.e., some sufficiency relation holding between antecedent and consequent. Thus the c-proposition expressed by (12) is the proposition that in some cases the truth of the antecedent, namely that some person wants to take the subway train x, suffices for the truth of the consequent, i.e., that x is already full. And the c-proposition expressed by (13) is the proposition that the truth of the antecedent, namely that some thing y is very expensive, does not in all cases suffice for the truth of the consequent, i.e., that y is very good.

So we have to distinguish between bare and quantifying c-constructions and accordingly between bare and quantifying c-propositions. And this distinction is correlated with another one which is more familiar in NP-semantics than in clause semantics, the distinction of number or more precisely of semantic number, i.e., quantity (cf. G. Link's contribution to this volume).

The distinction comes up if contingent constraints require that there be at most one pair of antecedent and consequent, for instance if the death of a person is concerned. Consider (14) and (15):

(14)   If Max has died, he has committed suicide.

(15)   If Max has died, he has always committed suicide.

(15) is not ungrammatical, but it is in conflict with the constraint 'you die only once', which shows that quantified c-constructions carry the implicature that there has to be more that one case of the antecedent.

On the other hand there are c-constructions like the German *falls*-construction that require the opposite, namely that only one instantiation of the antecedent be considered, as can be seen from the following examples:

(16)   Wenn Steffi gewinnt, wird   gefeiert.
        If   Steffi wins,   IMPERS.PASSIVE   celebrate.

(17)   Immer wenn Steffi gewinnt, wird   gefeiert.
        Always if   Steffi wins,   IMPERS.PASSIVE celebrate.

(18)	Falls	Steffi	gewinnt,	wird		gefeiert.
	In-case	Steffi	wins,	IMPERS.PASSIVE		celebrate.
(19)	*Immer	falls	Steffi	gewinnt,	wird	gefeiert.
	Always	in-case	Steffi	wins,	IMPERS.PASSIVE	celebrate.

To sum up these findings let us say that explicitly quantified c-constructions are plural forms, bare c-constructions with particles like *if* are transnumeral forms (unspecified with respect to number), and that bare c-constructions with particles like *falls* are singular forms.

1.2. A universal inventory of conditional markers

So far we have looked only at markers for protasis clauses that happened to be particles or subordinating conjunctions like *if*, *in case*, *wenn*, or *falls*, but it is well known that there are more means for marking clauses as protases, or more generally as c-constructions, in the languages of the world,[4] and also in English and German.

They can be arranged in the following four groups:

(a) <u>Morphological conditional markers</u>

(a) i. <u>Mood markers</u>

One can speak of morphological mood markers if there is a special set of inflexional forms in the verbal paradigms that encode a conditional mood, i.e., which mark those clauses as protases that have this form as their main verb form or forms, alone or together with other markers. A well-know example of a language with this kind of marking is Turkish. Other examples are West Greenlandic, Aranda (a Pama-Nyungan language), Basque and Nkore-Kiga (a Bantu language). The following example is from West Greenlandic:[5]

(20)	pakasa-anna-rukku	pissanganar-niru-vuq
	surprise just 2s-3s-COND	be-exciting more 3s-INDIC
	'If you just surprise him it will be more exciting'	

(a) ii. <u>Other suffixes</u>

The Papuan language Hua[6] and Imbabura Quechua[7] have other morphological devices for conditional marking that are not verbal mood markers but mark a clause as subordinate and topical, and thereby as protasis.

(b) Lexical conditional markers

These are the words or lexicalized expressions, mostly particles, that convert a simple clause into a protasis clause. Examples were given in section 1.1. Danielsen (1968) distinguishes between those lexical conditional markers which combine with negative forms and those that don't an instead have special forms for negated protases like Danish (*hvis* 'if' vs. *medmindre* 'if not'). Some lexical protasis markers are relative pro-forms, the protasis being a free relative clause. An example are German *wenn*-clauses, which abstract out of the protasis clause the sum of conditions that are sufficient for the truth of the antecedent. Plugging them into another clause makes the proposition of the latter depend on precisely these conditions. This is exactly parallel to other free relatives, for instance local ones, which abstract out of a proposition its location and make it thus available as the location for another proposition, cf. (21) and (22):

(21)   Wo   man singt, da   laß dich   ruhig nieder.
        Where one sings, there let yourself quietly down.
        (Locations of singing are locations where you can settle quietly)

(22)   Wenn eine Zahl   durch vier   teilbar   ist, dann ist sie gerade.
        If   a   number by   four divisible is, then is   it   even.
        (Conditions of being divisable by four for a number are conditions of it being even)

(c) Phrasal conditional markers

These are mostly modifications of some default complementizer. A good example of a language with a host of different constructions of this type is Spanish, where the default complementizer is *que* 'that' and where among others the following phrasal protasis markers exist: *suponiendo que*, 'supposing that', *ya sea que*, literally 'be it already that', *siempre que*, literally 'always that', *con tal que*, literally 'with such that'. An illustration is (23):

(23)   Te   perdono   con tal   que vayas.
        To-you forgive-1s with such that go-SUBJUNCTIVE-2s.
        'I forgive you if you go.'

(d) Structural conditional markers

A marked word order can indicate that a given clause functions as a protasis. A good example is German, where verb-first clauses are quite commonly used as protases.

(24)   Ist der Ruf   erst ruiniert, lebt sich's   gänzlich ungeniert.
        Is the reputation but ruined,   live-IMPERS   entirely free-and-easy.
        'Once the reputation is gone life is entirely free and easy.'

Note that no ambiguity can arise here as to which clause is the subordinate one and which one is the main clause, since German declaratives are verb-second, and therefore the first clause cannot be the main clause.

Summing up this overview of conditional markers it has to be stressed that they are by no means mutually exclusive in one construction, and that on the contrary cooccurrence is quite frequent, in some cases even obligatory.

The latter is the case for instance with English so-called counterfactuals, where morphosyntactic marking of the verbal mood and tense has to cooccur with either an *if*-marking or a verb-first construction of the protasis, compare (25) and (26).

(25)   If I had known, I would not have gone.
(26)   Had I known, I would not have gone.

1.3. Relatives of the conditional forms across languages

Next follows an overview of the relatives of the conditional forms, including the same forms with different readings, and of their functions. If (P1c) above is correct, this will amount to giving an overview of those concepts that are tendentially most closely related to the conditional function.

(a) Relatives of the morphological conditional markers
(a) i. Mood markers
Not all languages have a conditional verbal mood, but those that have it tend to use it for other purposes in addition to the conditional marking. For instance West Greenlandic uses its conditional forms also for future marking. So future time reference, or time reference in general is one concept encoded by related forms and therefore a good candidate for a related notion.

Other languages that don't have a conditional mood do have other non-indicative moods, and these share with the conditional the property of separating the propositional content, Frege's 'Gedanke', from its assertion. Compare the German subjunctive I, that functions among others as a quotative evidential and shifts thus the responsability for the truth of the proposition in its scope to another person.

(27)   Das   Haus   sei   noch   nicht   fertig.
        The   house   be-SUBJ   still   not   ready
        (only in quotative contexts)

A more common non-indicative mood is the imperative, which, as is well known, can also occur in a marked, but cross-linguistically widespread conditional construction, cf. (28):

(28)   Pay him well, and he will do anything for you.

These findings can be summarized as presenting evidence that conditionality seems to be treated by natural languages as some kind of modal concept, or at least as a concept that belongs to the aspect-tense-mood-cluster.[8]

(a) ii. Topic markers
The protasis-marking suffixes of Hua and Quechua mentioned above serve primarily as topic markers, and this is not surprising, since protases tend to be topical all over the world.[9] This fact has lead John Haiman to the thesis that 'conditionals are topics',[10] and he means this not just as subsumption, but as identity,[11] but most linguists will consider this untenable and exaggerated. Ferguson et al. for instance write: "It is clear that not all topics are conditional clauses, and not all conditional clauses (at least in the sense of clauses with 'if') are topics."[12] Nevertheless, there is something to be accounted for.

(b) Relatives of the lexical conditional markers:
(b) i. Interrogative subordinators:
The relation between protasis markers and interrogative subordinators is especially nice to see in English, where if serves both functions, and the difference between the (argument) interrogative and the (non-argument) conditional can sometimes be only recognized from the intonation or punctuation:

(29)   I will ask Max if he prefers that.

(30)   I will ask Max, if he prefers that.

In (29) 'if' introduces an interrogative clause and could be replaced by 'whether', in (30) it marks a conditional clause and could be replaced by 'in case'.

(b) ii. <u>Temporal subordinators</u>
The relation between protasis markers and temporal subordinators is especially nice to see in German, where *wenn* serves both functions, and the difference between the two is often hard to tell:

(31) Wenn   du   nach München kommst, ruf mich bitte   gleich   an.
      If/When you   to   Munich   come,   call me please immediately Particle

Here, with the temporal reading, the *gleich* 'immediately' can only be interpreted as referring to your time of arrival, whereas the conditional reading allows (and even prefers) an interpretation of *gleich* as referring to the moment of uptake or the moment when the issue coded in the antecedent is decided.

(b) iii. <u>Local subordinators</u>
Local subordinators are sometimes used in a metaphorical sense, localizing the main clause proposition not in the same real space as the subordinate clause proposition, but in the same abstract space of possibilities:

(32)   Ihm   geht es   gut,   wo   nicht exzellent.
         3p.DAT goes it   well,   where   not   excellent.
         'He is doing well, if not excellent.'

This fits well together with the etymological information that Romance *si* comes from a second person deictic plus locative.[13] Conditional use of *where* can also be observed in English:

(33)   Where a man has two women, there will be trouble sooner or later.
(34)   The value of f for A is A_χ, where A_χ is that subset of A, that ...

Here again the *where*-clause does not specify the spacio-temporal location of the main-clause proposition, but the condition for its validity.

(b) iv. Causal subordinators

In view of what is often claimed about the roots of conditionalization in causality, one would expect to have direct relations between causal and conditional subordinators. But they are not easy to find, by contrast with the indirect connection via the topic markers and temporal subordinators. The latter can be seen in a comparison of two parallel sentences of German and English, (35) and (36). English *while* and German *weil* are historically the same word, but whereas the English form has retained its temporal meaning, the German form has developed into a causal subordinator:

(35)   Weil   er   warten muß,   liest   er ein   Buch.
        Because he   wait   must,   reads   he a   book.

(36)   While he has to wait, he is reading a book.

(b) v. Concessive subordinators

If one considers with König (this volume) concessive subordination the dual counterpart of causal subordination (and I think one should), it should not come as a surprise that here again the links with conditional marking are obvious. German *wenn*-clauses are prototypical conditionals, but the modal particle *auch* can modify them in two ways: If *wenn* comes first, the result is a concessive, if *auch* comes first, the result is an *even if*-conditional.

(37)   Wenn er   auch   warten muß,   er   bleibt   gutgelaunt.
        If   he as-well wait   must,   he   remains   in-good-spirits.
        'Although he has to wait, he remains in good spirits.'

(38)   Auch   wenn er   warten muß,   bleibt   er   gutgelaunt.
        As-well if   he wait   must,   remains   he   in-good-spirits.
        'Even if he has to wait, he remains in good spirits.'

(c) Formal relatives of the phrasal conditional markers

All our examples of phrasal conditional markers had the form of prepositional phrases. Prepositional phrases can also be used for spatial, temporal, causal and concessive specification, which already have been shown to be related concepts. In addition there are phrases like the one in (39) that have the function of relativizing the validity of a claim by restricting it to some aspects of its subject.

(39)   In certain respects, this has been an extraordinary meeting.

Here a modal element can be observed, although it is not one of the standard modals. These can be shown to be closely related by comparing *under any circumstances* with *necessarily/obligatorily, under no circumstances* with *impossibly*, and *under certain circumstances* with *possibly*.

(d) Formal relatives of the structural conditional markers

We have observed above that marked word order can serve as a structural conditional marker, e.g. verb-first in German or auxiliary-first in English. As is well known, the same formal means may serve additional purposes which are again modal in nature, namely the marking of sentence mood, especially the imperative and the interrogative one. (41) gives an example of the latter, (40) is the corresponding c-construction:

(40)	Hast	du	was,	dann	bist	du	was.
	Have	you	something,	then	are	you	something.
(41)	Hast	du	was?	Dann	bist	du	was.
	Have	you	something?	Then	are	you	something.

Interrogatives share with conditionals the property of not claiming their propositional content. No wonder that the German construction exemplified in (40) developed out of the construction exemplified in (41).

1.3. Summary of section 1

Summing up the results of our attempt to place conditionals into the context of their conceptual relatives across languages, we can say that we have found good evidence for the following assumptions:

(a) Conditionalization is a modal concept, i.e., a conditionalized proposition is a modalized proposition. Hence conditionals are modal operators. Just as you can say 'possibly' and necessarily', you can say in a way 'conditionally', 'unconditionally', and '*p*-conditionally.'

(b) To conditionalize a proposition is to localize it (in a metaphorical sense) in a hypothetical domain and thereby to relativize the validity of the consequent.

(c) The kind of modality expressed is according to the quantifier in the explicitly quantifying conditionals (just as with their local and temporal relatives), and it is some kind of accompaniment with bare conditionals, whose precise nature cannot be determined from the data and remains to be specified.

Now it is interesting to note that the research on conditionals in logically oriented formal semantics in the last twenty years came up with several accounts that can be interpreted as different attempts at spelling out one or the other specification of exactly this idea, although most of their authors did their in-depth-analyses without looking at languages other than their own.

2. A cross-linguistically backed account of conditionals and unconditionals

The affinity between the conceptual picture that emerges from cross-linguistic comparison and more recent formal semantics for conditionals can be seen most easily in those approaches that are cast in the possible worlds framework, because here the modal element is most conspicuous, but I hope to be able to show that it carries over to situation semantics, and I would venture the prediction that in the long run it will find its most convincing expression in this framework.[14]

2.1. The inadequacy of material implication and some proposals of how to overcome it

Several years ago, Angelika Kratzer told at the Chicago CLS-meeting the sad story of the decline of the Gricean account in the analysis of natural language conditionals (Kratzer 1986). The Gricean account tries to stick to material implication by explaining away its well-known problems with Grices well-known implicatures, and Kratzer argues that this does not work. All her arguments have to do with quantification and modality and are therefore in line with our cross-linguistic evidence that conditionalization is a modal concept. It is interesting to note in passing that she does not mention a very simple way to show that modality is involved, that can be found among others in Link 1979. It goes as follows. From the assumption that the natural conditional is the material implication, it follows that (1) and (2) are paraphrases of each other (the corresponding formulae are logically equivalent). But they are not paraphrases. (1) follows from (2), but not vice versa.

    (1) It is not the case that Mary gets sad if it rains.
    (2) It rains and Mary doesn't get sad.

What does follow from (1), and indeed seems a good paraphrase of it, is (3), and this shows that (1) contains a hidden generalizing modal element under the negation operator.

(3)   It's possible that both it rains and Mary doesn't get sad.

Therefore what at first glance looks like a good paraphrase for the conditional in (1), namely (4), turns out to be a sloppy way of saying what is more explicitly said by (5):

(4)   Rain doesn't occur without Mary getting sad.
(5)   Rain doesn't possibly occur without Mary getting sad.

(5) in turn invites paraphrases like (6) or (7), and there we are right at the heart of a modern formal account of conditionals.

(6)   Any rain situation comes with a situation where Mary gets sad.
(7)   Any case of raining is accompanied by a case of Mary getting sad.

One important step in the right direction was Lewis's treatment of adverbs of quantification as quantifiers over cases (Lewis 1975). Then Angelika Kratzer, drawing on Lewis' and other work, developed a unified theory of modality, that included not only a treatment of deontic and doxastic modal verbs, but also indicative and subjunctive conditionals (Kratzer 1978, 1981). Lewis had treated the latter in a very similar fashion, introducing the notion of a variably strict conditional (Lewis 1973). Irene Heim, working in parallel with Hans Kamp, embedded the conditionals into an incremental semantics (Heim 1982), and Jon Barwise rethought the old story in terms of strong intensionality, i.e., without possible worlds, but like Kratzer with the important notion of background as a relativization device (Barwise 1986).

Backgrounds can of course be compared with epistemic states, which are at the core of conditional logics like Gärdenfors's, but at least two important differences have to be born in mind: First, epistemic states are mostly modeled by sets of sentences, not by propositions or situation types,[15] and second, as Barwise has pointed out, the speaker might not know what the relevant background conditions are. However, if one rethinks belief change as incremental (or better step-by-step) specification of the described situation, theories of epistemic dynamics can be brought to bear in the development of situation semantics, and that is exactly what I am going to propose.

Gärdenfors's logic for conditionals is based on the Ramsey test, which says that a c-construction is element of a given epistemic state K just in case its apodosis is element of

the epistemic state that is the result of revising K to contain the protasis. This is what the following formula says.

(R) $A > B \in K$ iff $B \in K_A$

Recently, Gärdenfors has come to doubt the role of the Ramsey test as a basic ingredient of conditionals, because in non-trivial cases it contradicts some monotonicity assumptions,[16] but Hans Rott has argued that monotonicity is questionable anyway and that the incompatibilty results should therefore not be turned against the Ramsey test.[17] Since the Ramsey test-based conditional relation holds between any two sentences A and B that are already in K, which doesn't seem to be desirable, Rott proposes to replace it by a relation that is based on what he calls the strong Ramsey test. It requires not only the presence of B in the A-revision of K, but also its absence in the non-A-revision of K. This is formally expressed in (SR):

(SR) $A >> B \in K$ iff $B \in K_A$ & $B \notin K_{\neg A}$

The strong Ramsey test shows clearly the modal or dispositional character of conditionals, for it relates 'if A, then B' with two mutually exclusive alternative revisions of K.

I think that the intention behind the strengthening of the Ramsey test is correct, but that it results in an overkill. Remember that according to the original Ramsey test both 'if A then B' and 'if B then A' are in K, once both 'A' and 'B' are in K. That certainly does not seem to be intuitively warranted. But now with the strong Ramsey test we exclude the possiblity that both 'if A then B' and 'if not-A then B' are in K, which doesn't seem to be intuitively adequate either.

So it looks like we may be better off if we give up epistemic state revisions altogether in favor of something else, which could be called situation specification updates. Here is an outline of how this can be conceived.

2.2. Sketch of a strongly intensional update semantics

The picture of a typologically backed account of conditionals and related constructions that I am going to outline here in a framwork that I will call update semantics[18] integrates features from all the approaches mentioned in the last section. Its main innovation is a distinction between that characterization of the described situation which is actually

accepted, and those characterizations of the same situation which are only taken into consideration. This differentiation seems to be needed if one wants to be able to account for both the similarities and the differences between conditionals and their relatives, especially unconditionals, but its introduction has been motivated in the first place by the desire to account for non-declarative sentences. Interrogatives for instance in their normal use don't contribute to the accepted description of the intended topic situation, but only to the stack of descriptions that are considered.

The semantics is called update semantics because progress in discourse is conceived of as constant updating at both the discourse level, i.e., the discourse situation, and the discourse content level, i.e., the described situation. Every update takes place with respect to a background that is divided into four parts by the two oppositions factual/virtual and discourse/content.

The *factual discourse background* contains (at least) the situations that are made real by the preceding discourse, the *virtual discourse background* contains the discourse options that are open to the participants. E.g., if Max utters to Mia first "It's getting dark." and then "What time is it?", then normally that creates first a factual discourse background containing a situation of the type Max asserting towards Mia that it is getting dark and a virtual discourse background containing for Mia among others the option of commenting on that, and then a factual discourse background containing in addition a situation of the type Max asking Mia for the time and a virtual discourse background containing for Mia among others the option of answering the question and the option of rejecting it.

Now before I go on to say something about the factual and the virtual content background, I have to answer three questions:

(a)   What corresponds to a belief revision in update semantics?
(b)   How does this notion of background relate to Barwise's notion of background?
(c)   How do the answers to these two questions relate to the Austinian conception of a proposition?

The answer to the first question and to part of the last one is this: A proposition p is always about a situation s_p, let me call it the intended topic situation of p or simply the domain of p, and it says of this s_p that it is of a type t_p, let me call it the characterizing situation type of p or simply the type of p. Now the update semantical counterpart of a belief change in epistemic dynamics is in the simplest case an additional characterization of the same intended topic situation (expansion). So the Austinian notion of a proposition

is dynamicized into an Austinian picture of changing discourse content. Once the end of a discourse stretch is reached, this is of course indistinguishable from the old picture. But the dynamic picture helps also to state identity criteria for discourses: The end of a (stretch of) discourse is reached once the intended topic situation is changed. E.g., Max's two utterances cited above belong to the same stretch of discourse since they are about the same intended topic situation, namely the factual discourse situation. An utterance of "Joe is probably still asleep" would change the topic situation, if it is known to both Max and Mia that Joe lives in Hawaii.

How does this picture go together with Barwise's notion of a background? A discourse cannot start off from zero, i.e., without any characterization of what the intended topic situation is and what it looks like, but from some mostly quite general initial characteristics, which come from the pre-discourse situation and which I would like to call the initialization of a discourse content. So the content of a discourse at any of its states is the result of a sequence of updates of its initialization. Barwise's examples are compatible with the view that what he has in mind when he speaks of backgrounds for conditionals is exactly what I call the initialization of a discourse content. One of his main points, that backgrounds need not be (fully) known to discourse participants, can be argued analogously with respect to content initializations.

If this is correct, then my notion of a factual content background differs from Barwise's insofar as it does not only refer to the initialization of a discourse content, but also to its state at the moment when a new discourse contribution is made, and the two coincide only in the case of the very first contribution to a discourse. But maybe I am missing here what Barwise had in mind and the two notions coincide entirely.

The default initialization of a standard discourse (as opposed to its content) could be spelled out as 'Normal circumstances obtain'. This excludes spatial separation of the discourse participants as well as emergency situations etc. Cooperative discourse participants are obliged to update this initialization explicitly if it is not obvious that it is wrong.

Having said this I can say what the *factual content background* is. It is the Austinian proposition characterizing the intended topic situation as being of that type that is the result of changing the discourse initialization by the preceding discourse contributions and that is accepted as factual by the discourse participants. By contrast, the *virtual content background* is a set of options, of ways the intended topic situation could be and that are thematized. Each one of these options characterizes the intended topic situation by a different type and the set exhausts the ways the topic situation could be that are taken into consideration at the present state of the discourse. So formally the content

background could be modeled as the set of Austinian propositions that is its virtual part together with one distinguished element, that is its factual part.

In fact, every assertive discourse contribution updates first the virtual content background and only if it is accepted is it copied to the factual content background. If it is rejected or retracted, it stays in the virtual part of the background.

In the above example, Max's first discourse contribution has added to both the virtual and then, because Mia didn't object, to the factual content background (i.e., all of its elements) a characterization by the type 'it is getting late'. His second discourse contribution has not changed the factual content background, but has multiplied the elements of the virtual content background by enhancing their description by the parametric type 'it is x o'clock'. So assuming that Max opened the discourse with his first utterance and that the initialization states among others that the utterance time is either 5 or 6 o'clock, the discourse state after the two contributions will have a factual content background with the topic situation characterized by the initialization and the type 'it is getting late', and the virtual content background will have two members, one where the topic situation is characterized by the initialization, the type 'it is getting late', and the type 'it is 5 o'clock', and one where the topic situation is characterized by the initialization, the type 'it is getting late', and the type 'it is 6 o'clock'.

Both the factual and the virtual content background can be modeled by Austinian propositions with a parameter for the intended topic situation. A discourse will then be called true just in case the result of anchoring this parameter to the intended topic situation and of anchoring all parameters in the factual content background type is a true proposition. The propositions in the virtual content background will be called issues, a term I borrow from John Perry, and therefore issues are what is mostly called the propositional content of an utterance. If the utterance is assertive, then the issue is intended to be included in the factual content background, else it is going to be integrated into the virtual content background, as e.g. with interrogative, imperative or optative utterances. How is this difference modeled in update semantics? The difference is that an assertive discourse contribution, if it is accepted, has the effect that both the factual and copies of all members of the virtual content background are updated to include the type of the new proposition into the restriction, but with a nonassertive discourse contribution only the members of the virtual background are updated in such a way.

Here, the differences among the major types of interrogatives come to bear: A polarity interrogative induces a simple update of a copy of each element of the virtual background, an n-membered alternative interrogative induces for each element of the virtual background n updated versions, and an n-place constituent interrogative induces for each element of the virtual background an n-times parametric updated version.

Propositions can involve open issues, as is the case with the weak modals: The proposition that it is possibly raining involves the issue whether it is raining, so the virtual background is updated to include also this option. Now it should be obviuos how to model the strong modals: Updating the factual content background to include the proposition that it must be raining is accompanied by updating all members of the virtual content background to include that it is raining.[19]

With this basic picture of update semantics in mind, how can we make now formal sense of intuitions like the one expressed in (7)?

First, we have to model cases not as tuples of participants, as Lewis (1975) did, since, e.g., raining is nullary, but as situations, which in turn are conceived of as instantiating states of affairs or situation types.

Second, we have to specify the kind of update that is made if an assertion (or non-assertion) of a conditional issue is contributed to the discourse. The effect of the update, if it affects the *factual content background*, i.e., if the assertion is accepted, is that the intended topic situation is characterized as a domain where every subsituation or case c (with bare conditionals), that instantiates the antecedent type of situation, is part of a case c'' that contains both c and a case c' that instantiates the consequent type of situation.[20] One could speak thus of locally (i.e., in the intended topic situation) strict implication. With specific conditionals we have of course to replace 'every case c' by 'the case c' and analogously with the explicitly quantified conditionals.

The effect of the update of the *virtual content background* is different: For every member p a member p' is addedthat gets the same treatment as described above, a member p'' whose type includes the antecedent type, and a member $p+$, whose type includes both the antecedent and the consequent type of situation.

Suppose Max adds to his above-mentioned monologue: "If it is six o'clock, then Joe is getting up now in Hawaii", his assertion is accepted, Mia says: "It is six o'clock" and this is accepted as well. The effect is that the intended topic situation is widened to include not just Max' and Mia's discourse situation but also what Joe is actually doing in Hawaii. Thus the truth of the resulting accepted content will also depend on Joe.That is my basic picture of the effect of updating the content by adding a conditional issue.

Before going on to the last section I will add two remarks. The first one has the purpose to point out that according to this picture, the difference between a straight and a conditional proposition is just the difference between implicit and explicit antecedents. Remember that in our picture of a proposition, any proposition q is implicitly conditional on the intialization from which it started. A conditional proposition *if p then q* therefore explicitly re-relativizes the implicitly conditional q.

The second remark expands on the role backgrounds play in the progress of discourse. They are not only what is changed by the ongoing discourse, but also what makes portions of discourse adequate or inadequate. E.g. concessive conditionals like (8) are adequate only with respect to factual content backgrounds that can also be characterized by (9):

> (8) Even if Steffi plays, the stadium is not full.
>   [Any case of Steffi playing is accompanied by a case of the stadium being
>   not full. Implicature: Lower ranking events don't fill the stadium either.]
> (9) One would expect that if Steffi plays, the stadium is full.
>   [All normal cases of Steffi playing come with cases of the stadium being full.
>   Implicature: One would not expect the same of lower ranking events.]

2.3. Two puzzles and their treatment in update semantics

With this picture of conditionalization as restriction by locally strict implication in mind let us attack two puzzles.

The first one has to do with what I call modus ponens conditionals, namely conditionals that are asserted where the truth of the antecedent is in the factual background.[21] The puzzle is one for the Gricean account: With material implication this is equivalent with an assertion of the consequent, so why do people bother to utter a whole conditional? Are they just talkative, violating the maxim of quantity? I think not, I think they are saying something different.

Suppose you just told me that you are from Wellington, I believe you, add this to the factual background, and then I say:

> (10)   If you are from Wellington, then you should know Max.

According to my analysis this is not equivalent with (11), as the material implication analysis would predict, since p entails $((p \rightarrow q) \leftrightarrow q)$, but logically stronger, i.e., (10) unidirectionally entails (11) in such a context.

> (11)   You should know Max.

What (10) says on that background in addition to what (11) says is that your being from Wellington does not just happen to come along with your being obliged to know him, but

that it requires it, in other words that any relevant case of the former comes with a case of the latter. And this is similar to a causal statement, which would be, I submit, a closer paraphrase of (10) on the given background than the naked apodosis, if not a perfect equivalent, which is just a little more redundant in entailing once more what is already in the background:

(12)   Since you are from Wellington, you should know Max.

Here we have a case of both object domain causation and evidential motivation at once: First your being from Wellington causes you to be obliged to know Max, and second it is good evidence, i.e., knowing that you are form there is a good motivation, for supposing that you are in that obligation. But giving a motivation for a claim that one makes shows always a higher degree of cooperativity than leaving it out. So (10) and (12) are not only logically stronger than (11) in the given context, but show also a higher degree of cooperativity.

Of course, it is usual to abbreviate (10) as in (13):

(13)   Then you should know Max.

So far for the first puzzle, the non-redundancy of modus-ponens-conditional utterances, which also showed the close relation beween causal and conditional utterances. The difference between (10) and (11) is modeled in update semantics by different updates that result in propositions with different truth conditions: If the intended topic situation contains several cases of the antecedent type (hard to imagine with this kind of example), but only one case of the consequent type, then (11) may still be true, while (10) is false.

The second puzzle is posed by an apparent counterexample to my claim that conditionals restrict or relativize the validity of the consequent. There is a class of seemingly conditional constructions that do exactly the opposite: Instead of making a claim depend on some circumstance and therefore in an intuitive sense weakening it, they strengthen it in the same intuitive sense by claiming that its holds independent of the choice from some alternatively conceivable circumstances. And with this, as is easy to see, I am coming back to the unconditionals, because they are the construction type I am talking about here.

Barwise (1986) has drawn attention to the fact that a conditional like (14) presupposes normal background conditions to obtain such as that there is no pollen around that makes Claire rub her eyes and so on.[22]

(14)   If Claire rubs her eyes, then she is sleepy.

But human languages allow us to get rid of at least some of these background assumptions, for instance by saying (15) instead of (14):

(15)   Whatever the circumstances, if Claire rubs her eyes, then she is sleepy.

So normal conditionals impose further conditions on backgrounds that are restricted anyway, but clauses like *Whatever the circumstances* are able to remove background restrictions and thereby strengthen the claim they modify. That's why I have come to call them 'unconditionals'. Further examples are (16) and (17):

(16) Wherever you go, I will find you.
(17) Whether you like it or not, your talk was simply boring.

Interestingly enough, unconditionals seem to be enocoded in most languages by interrogative clauses, more precisely by alternative and constituent interrogatives. How come? These interrogatives define sets of issues (by enumeration or by parametric charac- terization) as representing exhaustively the range of options that are currently taken into consideration. And this exhaustiveness is exactly what causes the unconditionalization effect: If all options that come into question require q, then q, unless you take more options into consideration.

Conditionals on the other hand, even if they are of a disjunctive or a generalizing form, do not implicate that they exhaust what comes into question,[23] therefore they don't have in general the strengthening effect. Compare (18) and (19).

(18) If you take the plane to Antwerp, the trip will take 3 hours; if you take the car or go by train, it will take ten hours.
(19) ?If you take the plane to Antwerp, the trip will take 3 hours; whether you take the car or go by train, it will take ten hours.

(19) doesn't sound as correct as (18), because it presents going by car or by train as the only options under consideration where taking the plane is in the (virtual content) background. This can be only accepted with accommodation, i.e., supposing that after the first part of the sentence, the options are rearranged, and this goes together with the observation that the acceptability of (19) increases with the length of a pause after its first half.

Parametrically characterized antecedents behave analogically.[24] Compare (20) and (21):

(20) Whatever she wears, Amanda looks pretty.
(21) If she wears anything, Amanda looks pretty.

Why does (20) sound like a compliment, whereas (21) sounds like a macho-joke that amounts to quite the contrary? Because (20) invites to take only situations into consideration, where Amanda is dressed, whereas (21) does not carry such a restriction and in fact makes us think of the cases where she is not, inviting the inference that then she does not look pretty.

So the rule is: If the antecedent of a c-proposition exhausts the virtual content background at the current state of the discourse, then it is an unconditional, if not it is a regular conditional. In each case it should be encoded accordingly, if the language allows for distinct encoding.

Although intuitively the difference between unconditionals and conditionals seems to be striking at times, it lies only in the acceptability conditions of its utterance, not in the truth conditions of the resulting updated background, so both of them belong here.

Finally, looking back at our examples with the distinction between conditionals and unconditionals in mind, it turns out that not only the non-argument alternative and constituent interrogatives are unconditionals, but that also some of the supposed lexical and phrasal conditionals are in reality unconditionals, namely non-temporal *always* and *never*, as well as *in any case, under all circumstances*, in short all those where the exhaustiveness is built in into the meaning.

Notes

1. These are only the most prominent names of people who have influenced me through their writings, some more are mentioned in the bibliography, but to give an exhaustive list is probably not possible. I would however like to thank Godehard Link, Hans Rott and John Perry who have helped me by asking questions and giving valuable comments and criticism.

2. See van Benthem (this volume).

3. The existence of coordinated conditional clauses as in "Pay him well and he will do anything for you" (example (28) below) and "You close the door behind you and you feel arrested" (describing a room) seems to be at variance with this statement, but it can be argued that the combination of an imperative-

first conjunct with an indicative-second conjunct in fact turns the former into an adverbial, and that in the other case it is not the primary function of the first conjunct to conditionalize the second one.

4. Cf. Comrie 1986, Danielsen 1968.

5. Fortescue 1984.

6. Cf. Haiman 1986, 1978.

7. Cf. Cole 1982.

8. Also called TAM-cluster, although this does not reflect the unmarked order, cf. Bybee 1985.

9. Since topics in turn tend to be sentence initial all over the world (in fact new topics must precede the comment according to Gundel (1988:231f.)), Greenberg's famous universal 14 ("In conditional statements, the conditional clause precedes the conclusion as the normal order in all languages", Greenberg 1963: 84) seems to be a derivative rather than a primary phenomenon.

10. This is the title of Haiman 1978.

11. Haiman 1986: 215.

12. Ferguson et al. 1986: 10.

13. Traugott 1985: 291.

14. See the companion paper to the present one, Zaefferer 1990.

15. Hans Rott has pointed out to me that since Gärdenfors is working with closure under logical entailment this difference doesn't come to bear.

16. Gärdenfors 1988, ch. 7.

17. Rott 1990.

18. From an announcement of the 1989 European Summer School at Groningen, I learned that Frank Veltman, who used to call his framework 'data semantics', now also calls it 'update semantics'.

19. Situations are internally partially ordered with respect to containment, but for the more involved modalities they must be also externally ordered with respect to similarity, such that if there is some ordering source, say a deontically ideal situation, in the virtual background, it makes sense to speak of those situations that come as close to it, as is permitted by some condition. To give an example (Kratzer 1981): In an ideal situation nobody is treated unjustly. But a situation where somebody has suffered injustice comes closer to such an ideal situation if that person has received recompensation than if he has been silenced. With the similarity ordering on situations Kratzer's proposal of a two-fold relativization of the consequent can be accommodated.

20. If there are several such c, then there must be several such mutually disjoint c'.

21. Here I disagree with Hans Rott, who claims that '*ifs* are accepted only if the antecedent is not accepted' (1986: 356) and therefore has to deny the very existence of modus ponens conditionals.

22. (14) could be paraphrased as "Under default circumstances, if Claire rubs her eyes, then she is sleepy", if the latter way of phrasing it would not invite the inference that non-default circumstances are taken into consideration, which is exactly what the Barwise example wants to rule out.

23. Hans Rott (p.c.) suggests that in effect they implicate the contrary.

24. The following examples are repeated from Zaefferer 1987.

References

Barwise, Jon: 1986, 'Conditionals and Conditional Information', in Elisabeth C. Traugott et al. (eds.), *On Conditionals*, Cambridge University Press, Cambridge, 21-54.

Bybee, Joan L.: 1985, *Morphology. A Study of the Relation between Meaning and Form*, John Benjamins, Amsterdam.

Cole, Peter: 1982, *Imbabura Quechua*, Croom Helm, London.

Comrie, Bernard: 1986, 'Conditionals: A Typology', in Elisabeth C. Traugott et al. (eds.), *On Conditionals*, Cambridge University Press, Cambridge, 77-99.

Danielsen, Niels: 1968, *Zum Wesen des Konditionalsatzes, nicht zuletzt im Indoeuropäischen*, Odense University Studies in Linguistics, vol.1, Odense University Press, Odense.

Ferguson, Charles A., Judy Snitzer Reilly, Alice ter Meulen, Elizabeth Closs Traugott: 1986, 'Overview', in Elisabeth C. Traugott et al. (eds.), *On Conditionals*, Cambridge University Press, Cambridge, 3 - 20.

Fortescue, Michael: 1988, *West Greenlandic*, Croom Helm, London.

Gärdenfors, Peter: 1988, *Knowledge in Flux. Modeling the Dynamics of Epistemic States*, MIT Press, Cambridge, MA.

Greenberg, Joseph H.: 1963, 'Some Universals of Grammar with Particular Reference to the Order of Meaningful Elements', in Joseph H. Greenberg (ed.),*Universals of Language*, MIT Press, Cambridge, MA, 73-113.

Gundel, Jeanette K.: 1988, 'Universals of topic-comment structure', in Michael Hammond, Edith Moravcsik, and Jessica Wirth (eds.), *Studies in Syntactic Typology*, John Benjamins, Amsterdam, 209-239.

Haiman, John: 1978, 'Conditionals are Topics', *Language* **54**, 564-589.

Haiman, John: 1986, 'Constraints on the Form and Meaning of the Protasis', in Elisabeth C. Traugott et al. (eds.), *On Conditionals*, Cambridge University Press, Cambridge, 215-227.

Heim, Irene: 1982, *The Semantics of Definite and Indefinite Noun Phrases*, Ph.D. thesis, UMass, Amherst.

Kratzer, Angelika: 1978, *Semantik der Rede. Kontexttheorie, Modalwörter, Konditionalsätze*, Scriptor, Königstein.

Kratzer, Angelika: 1981, 'The Notional Category of Modality', in H.-J. Eickmeyer and H. Rieser (eds.), *Words, Worlds, and Contexts. New Approaches in Word Semantics*, de Gruyter, Berlin.

Kratzer, Angelika: 1986, 'Conditionals', in A. Farley et al. (eds.), *CLS 22, part 2: Papers from the Parasession on Pragmatics and Grammatical Theory*, Chicago Linguistic Society, Chicago, 1-15.

Link, Godehard: 1979, *Montague-Grammatik. Die logischen Grundlagen*, Fink, München.

Palmer, F. R.: 1986, *Mood and Modality*, Cambridge University Press, Cambridge.

Rott, Hans: 1986, '*Ifs, Though*, and *Because*', Erkenntnis **25**, 345-370.

Rott, Hans: 1990, 'Conditionals and Theory Change: Revisions, Expansions, and Additions', Synthese **81**, 91-113.

Traugott, Elisabeth C.: 1985, 'Conditional Markers', in John Haiman (ed.), *Iconicity in Syntax*, John Benjamins, Amsterdam, 289-307.

Traugott, Elisabeth C., et al. (eds.): 1986, *On Conditionals*, Cambridge University Press, Cambridge.

Zaefferer, Dietmar: 1987, 'Unconditionals', Paper read at the Conference on Logic and Linguistics, sponsored by the Association for Symbolic Logic and the Linguistic Society of America, July 10, 1987.

Zaefferer, Dietmar: 1990, 'Conditionals and Unconditionals in Universal Grammar and Situation Semantics' in: Robin Cooper, Kuniaki Mukai, and John Perry (eds.), *Situation Theory and its Applications I*, CSLI, Stanford, 471-492.