CONDITIONALS: TRUTH CONDITIONS, PROBABILITY,
AND CAUSALITY

Conditionals and specific links—an experimental study

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Abstract

Based on the new experimental evidence, we argue that a link between a conditional antecedent and the consequent is semantically expressed rather than pragmatically conveyed. In our paper, we focus on particular kinds of links which conditionals may convey in a context. For instance, a conditional 'If p, q' may convey a thought equivalent to 'p will cause q', 'p is the best explanation for q', 'q follows from p', etcetera. The traditional theoretical literature on conditionals seems to imply that these specific links are generated pragmatically and are akin to conversational implicatures. In order to test this hypothesis, we used a well-recognized linguistic test from 'reinforceability' (i.e., susceptibility to a non-redundant affirmation), which serves to distinguish between a semantic and pragmatic level of meaning, and we designed an experimental study based on that test. The outcome of our study is that specific links conveyed by conditionals exhibit features of semantic entailments rather than conversational implicatures. This result accords with some of the recent findings in empirical investigations on conditionals. In the final part of our paper, we discuss various accounts of conditionals which can accommodate the results of our study.

Keywords Conditionals · Conversational implicatures · Pragmatics · Reinforceability · Semantics

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1 Introduction

A felicitous use of an indicative conditional of the form 'If *p*, then *q*' should assume a link between the antecedent *p* and the consequent *q*. It is hard to provide a full and precise theoretical explanation of the general nature of this link. However, it is also recognized that a particular conditional statement may express—on a given occasion—a quite concrete relation between its subclauses which is, in turn, relatively easy to characterize.[1] Consider the following example:

(1)   If you press the button, the machine will start working

It seems natural to interpret this sentence as a claim equivalent to 'pressing the button will *make* the machine start working'. Another example:

(2)   If a patient has a swollen neck, it must be mumps

In a respective context, this conditional can be taken as a claim that a swollen neck is *evidence* of mumps (e.g., imagine a medical instructor saying (2) to her/his students). Finally, (3) below can be naturally understood as 'being 18 is a *requirement* everyone must meet in order to be permitted to buy alcohol':

(3)   If you are eighteen, you are permitted to buy alcohol

Surely, there are more examples of this sort where a given conditional can be easily associated with a particular kind of connection between its subclauses. Sometimes this connection is suggested by the contents of the subclauses and our world knowledge, on other occasions, it is related to the context of a given utterance, or both. Let us call these particular relations which may be expressed by conditionals 'specific links'. We use the term 'specific' in order to distinguish these links from the unspecified implicative link which holds between the antecedent and the consequent in general.[2]

The aim of our paper is to address the following question: are specific links semantically expressed by conditionals or rather pragmatically conveyed by the speaker who utters a given conditional? In other words, we ask at what level the interpretation indicating a particular relation between the antecedent and the

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[1] See, for example, Björnsson (2011, pp. 104–105) who lists over ten different types of relations which may be expressed by 'if-then' (see also Douven et al., 2018, p. 50). For some discussion and further distinctions of the link types, see Douven and Verbrugge (2010).

[2] We are not committing ourselves to the view that there exist two separate links which are expressed by a given conditional: the general and the specific one. Rather, we observe that—with a concrete conditional statement such as (1)—we may associate a general interpretation (e.g., 'pressing the button is somehow relevant to the fact that the machine starts working'), as well as a more specific one (i.e., 'pressing the button will result in that the machine starts working'). But these links are not independent. On the contrary, it seems that the general implicative link conveyed by the conditional form is realized in this particular case by the causal connection. So, in a sense, these are the same links, yet they can be distinguished conceptually.

consequent is generated. In order to answer this question, we employ a familiar linguistic test of distinguishing between the semantic and pragmatic aspects of meaning in an experimental setting. This is a test from 'reinforceability' (cf. Levinson, 2000; Sadock, 1978). We chose three kinds of specific links as the subject of our tests. Contrary to what one may expect, the experimental results provide evidence for the claim that these links are semantically expressed by conditionals. In our paper, we will not give a response to the question how exactly they are expressed, nor argue for a unique theory of conditionals which should be favored in light of our empirical findings. Instead, we discuss the significance of our results to a semantic theory of conditionals in general and indicate several theoretical approaches which can easily accommodate these results.

Our plan is the following. Firstly, we discuss an account of specific links which can be reconstructed based on classical approaches to conditionals (Sect. 2). Roughly, this account says that a specific link is generated pragmatically. In Sect. 3, we discuss the alternative suggested by more recent (largely empirical) literature on conditionals. However, as we will argue, the existing data is insufficient for resolving the central issue of our paper. In Sect. 4, we present the test from reinforceability from a theoretical side and, in Sect. 5, our experiment based on that test. In Sect. 6, we discuss the relevance of our results and indicate various ways in which specific links can be accounted for.

2 Gricean account and pragmatic explanation of specific links

As it was said at the beginning, a felicitous conditional statement should assume a link between the antecedent and the consequent, which can be roughly characterized as 'inferential'. The issue of how to account for this link requirement has been much discussed in literature, both earlier and the more recent one, and the proposed solutions may indicate to us how we can account for *specific* links expressed by conditionals. So, we will now discuss proposals concerning the general link between a conditionals' clauses, starting with the pragmatic approach.

The discussion on the link requirement has naturally concentrated on the conditionals whose subclauses lack any connection, or where the connection is totally obscure. These are sometimes so-called 'missing-link' conditionals. The problem is how to account for them and do justice to the intuition that they are odd or even unintelligible. Consider an example:

(4) If two plus two equals four, then Warsaw is the capital of Poland

This sentence is not likely to be accepted by most ordinary users of language. Indeed, we intuitively hesitate to classify it as 'true'. This prima facie suggests that the general inferential link between the antecedent and the consequent is a part of a conditional's truth conditions (if there are any.)

Yet, this claim has been often denied by different theories of conditionals. Most of them agree that *whenever* a conditional has true subclauses—i.e., both the antecedent and the consequent are true—the conditional is true as well. Accordingly,

the sentence (4) is true. This is a prediction of such theories as: the truth-function-alist view (Grice, 1989; Rieger, 2013), Stalnaker's possible-world analysis (Stalnaker, 1968; see also Nolan, 2003), and the 'suppositionalist' theory (Adams, 1975; Bennett, 2003; Edgington, 2007).[3] However, it should be noted that the indicated approach to conditionals is not unexceptional. Various nonclassical logics introduce conditional connectives which require a stronger connection between subformulas in order to yield a *true* formula.[4] The prominent example is 'relevance logic' which seeks to provide a more refined concept of implication (see, e.g., Routley et al., 1983; Dunn & Restall, 2002). The analyses of natural-language conditionals based on relevance logic (e.g., Mares & Fuhrmann, 1995) do not treat conditionals with unrelated clauses as true. A more recent theory falling under this approach is 'inferentialism', which will be discussed in the next section.

Those who believe that missing-link conditionals can be true try to explain away their oddity in pragmatic terms. There have been various attempts of doing so, among others, the ones which appeal to modulation or discourse coherence (cf. Cruz et al., 2016, p. 1108). Perhaps the most influential one is the classic proposal of Grice (1989). In his account, a sentence of the form 'If p, then q' is semantically equivalent to the material implication (i.e., it is true iff p is false or q is true). However, someone who utters a conditional should respect the conversational maxims, in particular, should convey an appropriate amount of information (Maxim of quantity). A person who makes a conditional statement 'If p, q' based solely on the falsity of p, or the truth of q, violates the aforementioned maxim since both statements—'it is not true that p' and q—are more informative than the (materially understood) conditional (Grice, 1989, p. 61; Strawson, 1986, p. 236).

The presented pragmatic explanation has been actually adopted by different theoreticians, independently of the fact whether they agree with the particular semantic analysis of 'if–then' proposed by Grice:

> To reject Grice's defense of the truth-functional conditional is not to reject wholesale the Gricean thought that you can mislead your audience by expressing a belief, when there is something more appropriate you could have said. (Edgington, 2007, p. 159)

What is important about Grice's explanation of why missing-link conditionals are misleading is that it gives an answer to the question why conditionals convey a link between the antecedent and the consequent at the same time. A cooperative speaker who asserts 'If p, q' must be justified in what s/he says (as required by the Maxim of quality), but the speaker's justification should not be an opinion about the truth-value of p, nor of q (as required by the Maxim of quantity). Hence, the justification may only appeal to a *relation* between p and q, i.e., that p excludes the possibility that q is false, or makes it unlikely. This means that the speaker must recognize a

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[3] The 'suppositionalists' sometimes deny that conditionals have truth conditions. Yet, the problem can be rephrased in terms of 'credibility': whenever q is highly probable, given the supposition that p, 'If p, q' is highly credible whether or not there is any connection between p and q.

[4] We owe this remark to an anonymous referee and, independently, to Kordula Świętorzecka.

certain connection between *p* and *q* and this connection has apparently an implicative nature. Observe now that the existence of such a connection is something that can be derived based solely on the maxims, so for the Gricean, the utterance of 'If *p*, *q*' *conversationally* implicates that there is a general inferential link between *p* and *q*. This implicature seems to be *generalized* (GCI) rather than *particularized* (PCI) since it arises in "normal" circumstances and does not depend much on contextual knowledge.

All in all, the Gricean has a neat explanation—in terms of conversational maxims—of the link requirement in conditionals. At this point, we are ready to explain where the specific links come from. If an utterance of 'If *p*, *q*' regularly implicates the connection between *p* and *q*, then—in a particular context—this connection may be a basis for inferring a more specific link in light of some background knowledge. For instance, assuming that the utterance of (2) ('If a patient has a swollen neck, it must be mumps') conveys the general inferential link between a swollen neck and having mumps, the hearer can easily derive an interpretation—based on her background knowledge—that this link has an evidential character, i.e., a swollen neck is a *sign* of mumps. The evidential interpretation is also suggested by the use of 'must' in the epistemic sense, which is sometimes analyzed as an evidential marker suggesting an inference (see, e.g., von Fintel & Gillies, 2010).

To sum up, based on Gricean pragmatic account of conditionals, specific links can be explained in terms of conversational implicatures, as they are rooted in the Cooperative Principle. Provided that they generally depend on background knowledge and are also related to the particular contents of a conditional's subclauses (and not merely the conditional form), we should perhaps conceive them as phenomena more similar to PCIs than GCIs. All in all, they can be treated as genuine pragmatic phenomena which arise in the way typical for implicatures.

3 Inferentialism and semantic account of specific links

Although the pragmatic account of the link in conditionals has been a received view for some time, many theorists have started to question it in recent years and defend the claim that the link should be explained semantically. In addition, the research in the field of psychology of reasoning provides stronger empirical evidence for this claim than for the competitive view that the link requirement is posed by pragmatics. We will briefly recapitulate these contributions here and observe that they are compatible with a semantic explanation of specific links. However, we will conclude by saying that the considerations presented so far do not provide a conclusive argument for either the semantic or the pragmatic account of specific links.

One view which sees the link requirement as a part of the semantic meaning of 'if-then' is 'inferentialism' (Douven et al., 2018, 2019; Krzyżanowska et al., 2014). It is the position which claims that a conditional is true if there is an inferential or reason-giving connection between the antecedent and the consequent, so to speak, the antecedent provides a *strong enough argument* for the consequent in light of some background knowledge. This connection may be deductive, abductive, inductive, or mixed (see Krzyżanowska et al., 2014); at least, the truth of the antecedent

does not have to *guarantee* the truth of the consequent. According to the most recent formulation of 'inferentialist' truth conditions (Douven et al., 2019, p. 16), a conditional is (i) true if there is a strong enough argument from the antecedent (plus background knowledge) to the consequent, (ii) false if either there is a very weak argument connecting the antecedent and consequent, or there is an argument from the antecedent to the negation of the consequent, (iii) neither true nor false if there is no argument from antecedent to the consequent at all.[5] Consequently, missing-link conditionals cannot be treated as 'true' according to inferentialism in any form (e.g., (4) is predicted to be truth-valueless by the presented version of inferentialism unless the fact about Poland's capital bears some relevance to the arithmetic truth).

An approach similar to inferentialism is taken by Vidal (2017), who addresses the problem of 'even-if' conditionals and provides a compositional semantics for them. His proposal is built on Stalnaker's possible-world semantics, but contrary to Stalnaker's theory, it predicts that missing-link conditionals are false. The idea is that in order to evaluate a conditional 'If p, q' one needs firstly to suspend some beliefs (i.e., to treat them as neither true nor false), in particular, one's beliefs about whether p is the case ('inhibition' stage) and then adopt some beliefs, including p, and find whether q holds in the *reconstructed* set of beliefs, in line with Ramsey's test (the 'reconstruction' stage). Technically, the proposal replaces Stalnaker's selection function with two different functions ('neutrality' and 'expansion') and employs a non-bivalent logic. A consequence of this modification is that the following law is no longer valid: whenever p and q are true in the actual world, so must be 'If p, q'. A relevant connection between p and q is required for q to be true in *any* reconstructed state (i.e., sets of possible worlds) where p holds.

In recent years, there has been some interest in the issue of a link requirement in cognitive psychology. Several experimental studies reported no effect of connection between a conditional's subclauses for people's judgements on acceptability (Oberauer et al., 2007; see also Cruz et al., 2016) or a very weak one (Over et al., 2007).[6] However, some concerns have been raised with regards to the validity of these results; in particular, Skovgaard-Olsen et al. (2016) observed that Oberauer et al. (2007) did not use any realistic stimulus material that would enable the participants to form their own relevance expectations based on their background knowledge, while Over et al. (2007) used the materials representing a narrow spectrum of possible relevance relations between a conditional's subclauses (Spohn, 2013, p. 1092; Skovgaard-Olsen et al., 2016, p. 28).

Subsequent and more advanced studies have strongly confirmed the prediction that conditionals generally require a connection between their subclauses. Contra Oberauer et al. (2007), Skovgaard-Olsen et al. (2016) have found the effect of

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[5] An important difference between the presented proposal and the earlier one by Krzyżanowska et al. (2014) is that the former incorporates the idea of semantic indeterminacy, i.e., predicts that conditionals may be neither true nor false in some cases.

[6] The general requirement link is usually defined in terms of 'probabilistic relevance' which assumes, roughly speaking, that the truth of the antecedent raises the probability of the consequent. Alternatively, it is characterized in terms of a discourse topic connection. In light of this approach, missing-link conditionals are viewed as lacking a common topic.

(positive) relevance of the antecedent to the consequent for a conditional's acceptability, in addition to the high conditional probability. This result has been further confirmed by the study of Skovgaard-Olsen et al. (2017). Relatedly, Douven et al. (2018) showed that whenever the relevance connection between the antecedent and the consequent is suppressed, people are more likely to give indeterminate responses in their evaluation of the conditional ('neither true, nor false') than when the relevance connection is guaranteed. The study, according to its authors, provided support for the conclusion that people judge the truth-value of a conditional by assessing the strength of the inferential connection between its subclauses.[7]

Among the empirical investigations of conditionals, the ones which focus on the so-called 'Centering' or 'and-to-if' inferences seem to be particularly important. According to these principles, 'If *p*, *q*' can be inferred from its constituent sentences given as two independent premises or their conjunction (depending on the principle's variant). Hence, if these principles are valid, then conditionals *do not* entail a link between its subclauses, as both sentences *p*, *q* may be unrelated. However, it is a matter of controversy whether people indeed endorse such principles. Although there has been some evidence given for this hypothesis (e.g., Cruz et al., 2015), the results of many other studies showed the opposite — that is, that people do not obey Centering in case of missing-link conditionals (e.g., Krzyżanowska & Douven, 2018; Skovgaard-Olsen et al., 2016; Vidal & Baratgin, 2017). A big recent study by Skovgaard-Olsen, Kellen, et al. (2019)—which employed an elaborated method of establishing the individual profiles of participants regarding conditionals interpretation (based on their case judgments and reflective attitudes)—indicated that people largely rejected 'and-to-if' entailments, irrespective of their profile classification. This result suggests that the individuals classified as adhering to 'suppositional-reasoning' interpretation of conditionals are likely committing a reasoning error, in contrast to the ones who adhere to 'reason-relation' interpretation.

Finally, some studies directly focus on the question whether a link requirement lies in semantics or pragmatics. Krzyżanowska and Douven (2018), who investigated the Centering principles, additionally tested the participants' predilection to focus on pragmatic implications of a sentence under evaluation instead of its semantic content (i.e., to commit a 'pragmatic/semantic' mistake). They found no correlation between the tendency to make the pragmatic/semantic mistakes and disobeying Centering. But the pragmatic account of link requirement is committed to the claim that people who reject Centering confuse the pragmatic and semantic aspects of meaning. Furthermore, Skovgaard-Olsen, Collins, et al. (2019) reported several experiments which suggested that the link is a *conventional implicature* triggered by 'if-then', and hence a part of its lexical meaning. All these results clearly

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[7] However, it is important to emphasize that the studies mentioned in this paragraph seek to support different theories of conditionals. While Douven et al. (2018, 2019) propose an account based on inferentialism as a semantic analysis and Hypothetical Thinking Theory with regards to conditionals' processing, Skovgaard-Olsen et al. (2017) defend the claim that inferential connections do not primarily affect the truth conditions of conditionals, in line with Frege-Grice tradition. His proposal is to account for the connection in terms of a conventional implicature (see Skovgaard-Olsen et al., 2019b).

count against the view considered in the earlier section that the link requirement is imposed by pure pragmatics.[8]

To sum up, there is significant evidence in literature, especially in the empirical part, for the claim that the conditionals semantically express a general inferential link between their subclauses. If this is correct, one may be tempted to entertain the hypothesis that specific links are generated by semantics, too. Inferentialism and similar accounts surely make room for this hypothesis. One way of accommodating it is to maintain that a default interpretation of a conditional indicates an unspecified link between its subclauses, but this interpretation can be modified or made more precise in a context, due to processes like meaning specification rather than Gricean derivations. Alternatively, we can say that the inferential content of a conditional can be enriched in a context, to the effect that it expresses a conjunction, e.g., 'p inferentially entails q and the entailment is causal'. (We will discuss these issues in more detail in Sect. 6). In any case, a specific interpretation of 'if-then' is *pre*-propositional, i.e., is processed prior to—and integrated as an element of—the compositional process of reconstructing the complete proposition expressed by a conditional statement. This, in turn, indicates that such an interpretation is generated at the semantic level and not derived as an implicature, since implicatures are commonly held to be *post*-propositional. All in all, inferentialism is definitely compatible with the semantic approach to specific links.

However, the conclusion that specific links are semantically relevant based solely on the considerations provided in this section would be definitely too hasty. Firstly, inferentialism does not automatically entail that specific links are semantically expressed by conditionals. It is still possible that while 'If p, q' semantically encodes a general inferential link between p and q, a more specific interpretation arises due to Gricean pragmatic processes and it has all features typical for this level of meaning, like cancelability, reinforceability, etc. Secondly, as far as we know, none of the existing studies concentrates on the issue of specific links, that is, addresses the problem of how a *particular kind* of a relation is actually expressed by a conditional in a context. Certainly, we have to focus on specific links directly, provided we want to formulate some substantive conclusions about their character and source. Finally, it is still an open question how the general inferential link expressed by conditionals should be best accounted for and whether it is truth-conditionally relevant. Needless to say, Gricean account of the link requirement has some defenders among philosophers of language (see Edgington, 2007; Rieger, 2013), as well as cognitive psychologists (like mental model theorists, e.g., Johnson-Laird & Byrne, 2002, p. 651). All these observations indicate that the answer to the question posed in our paper cannot be simply inferred from the current research on conditionals and thereby motivates a need for further study.

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[8] Another piece of evidence against this view, which is worth mentioning, is the result of Krzyżanowska et al. (2017) who falsified the hypothesis of Cruz et al. (2016) that the link requirement ought to be explained in pure pragmatic terms of discourse coherence.

4 Test from reinforceability

In this section, we outline the theoretical background of our experimental strategy. First, we introduce the notion of 'reinforceability' and the idea of a test based on that feature. Second, we formulate some restrictions of the test.

It is well recognized that conversational implicatures exhibit various distinctive features, like cancelability, non-detachability, calculability, etcetera (see Levinson, 2000). In particular, pragmatic implications are 'reinforceable', which shortly means that they are susceptible to a non-redundant reaffirmation (Grice, 1989; Horn, 1991; Levinson, 2000; Sadock, 1978). That is, one can add an explicit statement of an implicature to the utterance which already carries this implicature without an effect of clear redundancy. Let us illustrate this feature with two examples:

(5)   I met a man in my office. It wasn't my husband

(6)   The conductor had a nice tie and nothing more. The concert was not good

A sentence like 'I met a man…' implicates that the man in question is not directly familiar to the speaker (like a brother or a spouse). Otherwise, a more informative description would be appropriate. Yet, we can add this more specific information to the sentence itself and the whole utterance sounds fine. Assume now that (6) is said as a response to the question 'How did you like the concert?'; then its first part already implicates that the speaker did not enjoy the concert (as the Maxim of relevance is flouted). However, we can directly express that opinion after saying the words which would anyway implicate that we didn't like the concert in the presented context.

Even if the second clauses in the given examples may sound somehow redundant, there is a clear difference between these cases and the ones where a speaker adds a sentence which is presupposed or entailed by her preceding words, cf.

(7)   # I met my husband in my office. It was my husband

(8)   # The conductor had a nice tie, but I didn't like the concert. I was at the concert

The second clauses here sound *strongly* redundant to the effect that the whole utterances are conversationally anomalous.[9] So, there is a contrast between semantic entailments or presuppositions on the one hand, and conversational implicatures, on the other hand, in terms of redundancy levels of reinforcements like (5)-(8). Moreover, this feature seems to be characteristic to all kinds of pragmatic inferences in general, since any content derived in a pragmatic inference is reconstructed by the hearer based on what is said and some *additional* assumptions concerning the cooperativeness of the speaker and the facts about the world (see Horn, 1972, ch. 2.1; Horn, 1991, p. 320).

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[9] As it was observed (e.g., Meyer, 2015; Stalnaker, 1979), strong redundancy usually gives rise to infelicity.

Based on the feature of reinforceability, we can design a practical test for distinguishing these contents which are *semantically entailed* by a given sentence (from now on, we use this term broadly, as including logical and analytic entailments of the sentence, as well as its presuppositions) from all kinds of contents *pragmatically implied* (including, conversational implicatures and similar phenomena). Namely, if a content P sounds strongly redundant when reinforced—i.e., stated explicitly after an utterance U which already conveys P—then P is semantically entailed by S. On the other hand, if P does not sound so redundant when reinforced, then it is a pragmatic implication of U. Let us call this 'the test from reinforceability'.

Now, we must address the question whether the proposed test is really diagnostic. The first worry is related to Horn's (1991) considerations. He observes that there are some cases where semantic entailments can be reinforced without the effect of infelicity (although they do not, in fact, add anything to the already asserted content). Consider some of Horn's examples:

(9)   I don't know why I love you, but I do

(10)   She won by a small margin, but she did win

The second clause in (9) expresses the content that is presupposed by the first clause. (This claim can be justified by appealing to some facts about 'presupposition projection'; see Beaver & Geurts, 2014; Karttunen, 1973). A similar observation can be made about (10) where the first clause actually entails the second one. Both utterances (9) and (10) are perfectly fine at the same time, in contrast to infelicitous constructions such as (7) or (8). However—as Horn observes—(9) and (10) exemplify special cases which involve a rhetorical opposition between the first and the second clause. Indeed, in the cases where contrastive conjunction is ruled out, so is a felicitous reinforcement of a semantically inferable material (1991, pp. 322–323), e.g.,

(11)   # I know why I love you, {but/and} I do

In consequence, we may conclude that the test from reinforceability is not fundamentally wrong, but requires some restrictions.[10] We should avoid the cases involving a contrast of the presented type between the main clause and the reinforced one. A sure method to achieve this is to focus on the examples which do not allow for contrastive connectives (such as 'but') and can be naturally constructed with neutral conjunctions (such as 'and'), if any.

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[10] Moreover, as suggested by an anonymous reviewer, the reinforcement in Horn's examples has the semantic function to clearly incorporate something into a given state which is only at the boundary of it (e.g., a small victory is anyway a state of victory). In other terms, the repetition of the presupposed content has a specific role to play and this fact undermines the effect of redundancy that would normally arise.

The second concern is related to the fact that sometimes the speaker may implicate what is anyway entailed by the proposition expressed. An example of this is given by Bach (2005, sec. 3):

(12)　A: Nobody has ever long-jumped over 28 feet
　　　　B: Whad'ya mean? Bob Beamon long-jumped over 29 feet way back in 1968

In this example, B implicates—in response to A's remark—that someone did long-jump over 28 feet. Yet, the result of the reinforceability test seems to be negative, cf.

(13)　?# Bob Beamon long-jumped over 29 feet way back in 1968 and someone has ever long-jumped over 28 feet

The second conjunct is trivially entailed by the first one and thus (13) sounds redundantly.[11] Yet, as Bach insists, the speaker already implicates the second statement by making the first one. If Bach is correct, we have then an example of an implicature which is, in fact, non-reinforceable.

We do not want to engage here in a discussion whether the presented example is really a conversational implicature in light of some independent criteria. We only want to make one point: even if Bach is right, the test partially works here. The test provides a negative result precisely for the reason that the implicated content is at the same time *entailed* by the first sentence. So, it is one-way reliable: non-reinforceability indicates a semantic character of the entailment. (We emphasize this fact since it will become important in our further considerations.)

To sum up, we may conclude that the test from reinforceability is valid, provided we again incorporate some restrictions. Not only should we remember to avoid contrastive cases, but also treat the test as foremost diagnostic in one direction: if the content at issue is non-reinforcebale, then it is a semantic entailment. At least, this would guarantee that we do not encounter such examples as the one provided by Bach. Keeping all these remarks in mind, we will now proceed to our experimental application of the reinforceability test.

5　Experimental study on specific links

To make a long story short, we applied the test from reinforceability to specific links and observed that they are not reinforceable, that is, ordinary users of language found reaffirmations of these links redundant to a much greater extent than for conversational implicatures. Below we present the experiment and its results.

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[11] Of course, the whole utterance would not sound bad, if the speaker stressed explicitly that the second piece of information has to be a consequence of the first one—e.g., by using 'therefore', or 'so'. However, the constructions of this sort cannot be a subject of reinforceability tests for obvious reasons.

5.1 Experimental strategy and hypotheses

We focused on three kinds of specific links in our case study: the causal, deductive, and abductive inferential relation.[12] So, we investigated the cases where someone made a conditional statement 'If p, q' conveying that p is a cause of q, or p entails q, or p is evidence for (i.e., best explains) q, and then the speaker reinforced the link by adding explicitly '(And) p results in q', '(And) p entails q', etcetera. Our general aim was to test whether the second part of the statement sounded redundant to a significant degree to the study participants. In order to establish meaningful thresholds for the redundancy rates, we investigated (non)reinforceability of conversational implicatures and broadly conceived semantics entailments at the same time. Our strategy was to compare the level of redundancy of reaffirmed specific links to the levels of redundancy of reaffirmed implicatures on one hand, and reaffirmed semantic entailments on the other hand. This approach enabled us to assess to what kind of phenomena specific links are closer to, according to the reinforceability test.

A possible concern in constructing the reinforceability test for conditionals was that the participants may find the second sentence redundant not because the link has already been expressed by the first one, but because the sentence constituents have been repeated in the second statement (in order to indicate the nature of the link between them). As we have just said, the utterances to be evaluated had a form of, e.g., 'If p, q. (And) p results in q'. It could then happen that the bare word like 'results in' would drown in the sea of information that is literally repeated, i.e., the contents of p and q.[13]

In order to overcome this potential problem, we employed two independent strategies. The first one was not to repeat *all* the information contained in the conditional's clauses and use some anaphoric devices instead (e.g., 'If you press the button with a lollipop, then a lollipop falls out. Pressing the button will result in *this*.') The fact that not every clause was explicitly rephrased in the second sentence emphasized that the aim of the second sentence was primarily to indicate the link between the two contents. The second strategy was to repeat the contents of a conditional's clauses in a somewhat different way, not mirroring the structure they had in the first sentence; for example: 'If there are no sweets on the plate, the dog must have eaten them. The *empty plate* means that the dog *wolfed down* the sweets.' At the same time, we tried to apply close synonyms, or repeat the relevant elements but in a different configuration. This was to avoid situations where a subject's potential

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[12] By saying 'deductive', we mean that the consequent is naturally interpreted as a sort of analytical consequence of the antecedent in light of some background assumptions (e.g., 'If John checked only a half of the apples, he didn't check the other half.') Hence, it is a strong connection in the sense that the truth of the first clause guarantees the truth of the second one in a context. By saying 'abductive', we mean that the consequent indicated the "best" explanation for the antecedent (see example (2)). So, this kind of a connection is clearly weaker in the sense that the truth of the antecedent does not entail the truth of the consequent. Douven and Verbrugge (2010) presented evidence that these kinds of inferential relations in conditionals make a difference with regards to their acceptability, so they should best be treated separately.

[13] This concern was raised by a reviewer with regards to the previous version of our experimental study.

skepticism about redundancy would be related to the fact that he or she interprets the clauses repeated in the second statement as saying something different than in the first statement.

Let us now present our research hypotheses. In line with the theoretical considerations, we predicted that implicatures are reinforceable while semantic entailments are not. That is, we formulated the following hypotheses:

H1 A reinforced semantic entailment is taken to be redundant.

H2 A reinforced conversational implicature is taken to be definitely less redundant than a reinforced semantic entailment.

As far as conditionals and specific links are concerned, our prediction was that the patterns of responses for all three kinds of links would be more similar to the pattern of responses for the semantic entailments than for the implicatures. Crucially, we predicted that specific links are generally much less reinforceable than conversational implicatures. Thus we formulated two basic hypotheses:

H3 A reinforced causal/deductive/abductive link is taken to be redundant.

H4 A reinforced causal/deductive/abductive link is taken to be definitely more redundant than a reinforced implicature.

5.2 Method

5.2.1 Participants

Our experiment consisted of an online questionnaire prepared on the platform *LimeSurvey* and spread via *Mechanical Turk*. It involved 76 participants altogether; the responses of 18 of them were excluded from our analysis, as the respondents did not report English as their first language or failed to correctly answer the attention-check question. Our final sample consisted of 28 females and 40 males (average age: 39.91, SD = 12.84). All participants were recruited via *Mechanical Turk* and paid for their participation $2.00 each.

5.2.2 Design

Our study employed a simple design with five experimental conditions that were compared within participants: reinforcement of a semantic entailment, conversational implicature, and three others concerning the selected specific links (causal, deductive, and abductive). We will henceforth refer to these conditions as: SE, IM, C-link, D-link, and A-link, respectively. As we have said, the purpose of this manipulation was to establish how the type of a content (i.e., semantic vs pragmatic) affects redundancy judgements and what degrees of reinforceability specific links exhibit in comparison to these two general types of content.

5.2.3 Materials and procedure

All materials were in English and contained short fictional stories with a question at the end of each scenario. These stories ('contexts') presented some characters engaged in conversational situations and one of the characters made an utterance of two statements in such a way that the second one was a reinforcement of the content conveyed by the first one. We used ten different contexts per condition, which yielded 50 (10×5) target vignettes in total. In addition, we introduced five filler items which resembled the target vignettes in an appropriate way: they presented short stories where a character made two statements, and the participants had to evaluate the second one in terms of redundancy. Two of the fillers contained conditionals as first statements. Since we predicted that all experimental conditions except for one will get high redundancy rates, most of the fillers we created were such that the second statement uttered by a character was weakly– if at all—implied by the first one. Furthermore, the survey was constructed in such a way that fillers appeared as one-third of all questions. This altogether provided a counterbalanced design.

Below we present three samples of our vignettes: one with a conditional, one with a conversational implicature, and a filler:

[Context "Party organizing", C-link]
Jessica and Jim are discussing whom they are going to invite to their party next Saturday. Jim does not like Mr. and Mrs. Smith who are Jessica's colleagues, so he does not want to invite them. However, Jessica is trying to persuade Jim that they should invite the Smiths and during the conversation she says: "If we don't invite the Smiths, they will feel insulted. Not inviting them will result in this."
Does the second sentence uttered by Jessica is redundant/unnecessary as it repeats the information from the first one?
[Context "Cider", IM]
Mary wants to make cider using apples she has in the pantry, but only under the condition that all apples in the pantry are ripe. She asks her husband John to check the apples. John starts checking them and, so far, they are all ripe. But he hasn't finished checking all of them when Mary asks whether the apples are ripe. John replies: "Well, some apples are ripe. I don't know yet whether all of them are ripe."
Does the second sentence uttered by John is redundant/unnecessary as it repeats the information from the first one?
[Filler, "Tennis"]
Jane and Jeremy are playing tennis on a Saturday afternoon. Since it is quite hot, after an intensive match Jane proposes that she will go and buy some cold drinks and snacks. She asks Jeremy what he would like to get and he says: "If they have cold blackcurrant juice, you can buy me one. Also, buy me a tuna sandwich, please."

We made sure to provide a diversity of the examples used in our materials, in order to have a representative sample of a given category/condition. In SE, we included the cases of presuppositions and proper entailments where the second sentence

either repeated the whole information from the first one, or only a part of it. In IM, we used examples of both PCI and GCI, including scalar implicatures and unfamiliarity implicatures related to indefinite descriptions, among others.[14] In the remaining conditions—C-link, D-link, and A-link—we used conditionals of different grammatical forms (i.e., different moods and tenses). All materials are contained in the "Appendix".

At the beginning of the survey, the participants were briefly informed about the topic of the survey and conditions of participation. Next, they were asked to complete a short demographic survey (age, education, exposure to philosophy and first language). Following a simple attention-check, a question was asked in order to filter out MTurkers who do not treat taking part in surveys seriously.

Next, after a short instruction, each participants got one of five blocks of vignettes (randomly assigned). Each block consisted of 15 vignettes: 10 target items and 5 fillers.[15] All vignettes were presented separately and their order was randomized within a block. The task for participants was to read the story and evaluate the character's second statement in terms of redundancy. Each vignette ended with the question of the form: 'Does the second sentence uttered by X is redundant/unnecessary as it repeats the information from the first one?'. The participants expressed their level of agreement that the statement is redundant by choosing one answer from five options presented as a five-degree Likert-like scale: 'definitely no', 'rather no', 'hard to say', 'rather yes', 'definitely yes'.

At this point, let us stress that our experimental materials did not contain the problematic constructions considered in Sect. 3, so we ensured that our application of the reinforceability test is valid. Crucially, we did not include any example in which the first and the second sentence are contrastive. The reaffirmed content was either stated without any linking word to the previous sentence, or we sometimes used 'and' at the beginning of the second sentence. Furthermore, as we will see, we treated the study results as diagnostic in one direction—that is, as indicating whether the contents at issue are semantic or not.

5.3 Results

We will now present the results of our experiment. Figure 1 shows the distributions of responses in the non-conditional cases, that is, conditions SE and IM.

Unsurprisingly, most participants found the reinforced semantic entailments redundant (47.8% answered 'rather yes' and 27.9% 'definitely yes'). In order to facilitate a statistical analysis, we coded answers as numbers from 1 ('definitely no')

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[14] In two previous versions of our experiment, we further divided IM into two separate conditions: reinforcement of GCIs and PCIs. However, the difference between them in terms of redundancy rates has never proved to be statistically important; moreover, our aim here was to assess how implicatures in general perform in the reinforceability test, so the fact that they have a particularized or generalized character was not directly relevant to our experimental purposes. For this reason, we decided to treat implicatures uniformly in this most current version of the study.

[15] Precisely speaking, each condition was represented by two vignettes while each context was represented by exactly one vignette in a block (so the context was never repeated within a block).

	Condition			
	Semantic entailments (SE)		Implicatures (IM)	
Rate of redundancy	n	%	n	%
definitely no	10	7.4	42	30.9
rather no	16	11.8	38	27.9
hard to say	7	5.1	18	13.2
rather yes	38	27.9	27	19.9
definitely yes	65	47.8	11	8.1
Total	136	100	136	100

Fig. 1 Rates of redundancy for semantic entailment and implicatures

to 5 ('definitely yes'). We obtained the mean of 3.97 (SD = 1.01) which indicates a high level of redundancy judgments among the participants. Next, we conducted the one-sample Wilcoxon signed-rank test in order to check whether the answers differed significantly from the midpoint of the scale (3) and we obtained a statistically significant result (W = 1651, $p < 0.001$).[16] So hypothesis (H1) has been confirmed. As expected, the results for implicatures were much different. Only a minority of the respondents gave affirmative answers to the question on redundancy of a reinforced implicature (19.9% 'rather yes' and 8.1% 'definitely yes', M = 2.46, SD = 1.14, W = 556.5, $p = 0.003$). Accordingly, conversational implicatures were treated as much less redundant than semantic entailments. To test this prediction, we compared distributions of answers using the paired Mann–Whitney U test and we observed statistically significant differences (IM vs SE: U = 172, $p < 0.001$). Thus hypothesis (H2) has been confirmed, too.

Let us now focus on our main findings, namely, the redundancy rates for conditionals. Figure 2 shows the distributions of responses in the C-link, D-link and A-link conditions.

The results clearly show that all three types of links in conditionals are taken to be redundant when reaffirmed. In other words, hypothesis (H3) has been confirmed, since most of the respondents responded 'rather yes' or 'definitely yes' to the question on redundancy (C-link: 30.1% 'rather yes' and 41.2% 'definitely yes', M = 3.86, SD = 1.03, W = 1669.5, $p < 0.001$; D-link: 28.7% 'rather yes' and

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[16] The same procedure was employed in statistical analyses of the participants' answers in the other four conditions.

	Condition					
	C-link		*D-link*		*A-link*	
Rate of redundancy	n	%	n	%	n	%
definitely no	6	4.4	8	5.9	9	6.6
rather no	24	17.6	14	10.3	27	19.9
hard to say	9	6.6	20	14.7	6	4.4
rather yes	41	30.1	39	28.7	47	34.6
definitely yes	56	41.2	55	40.4	47	34.6
Total	136	100	136	100	136	100

Fig. 2 Rates of redundancy for specific links in conditionals
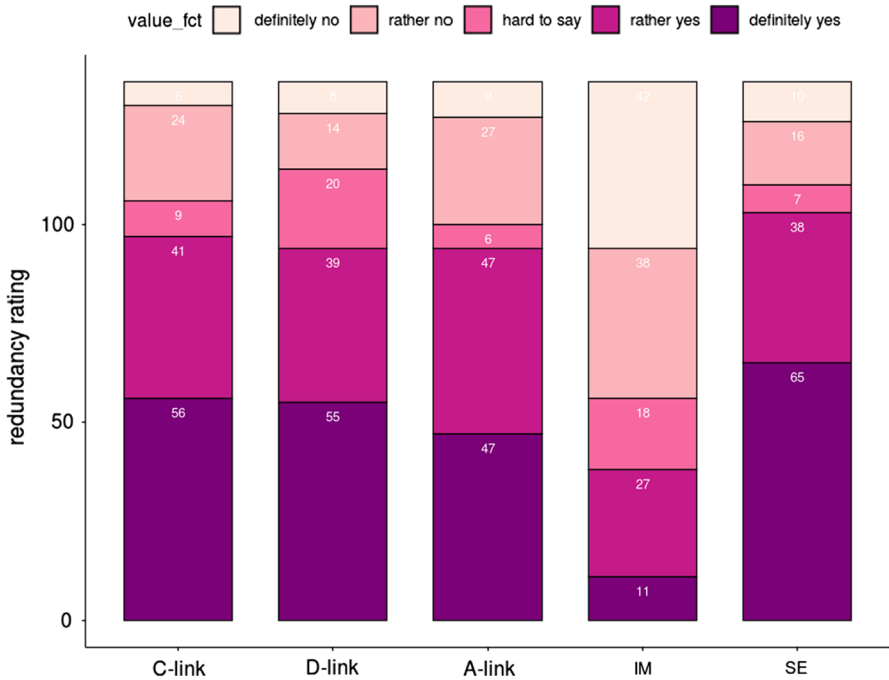
Fig. 3 Proportions of responses for specific links, implicatures, and semantic entailments
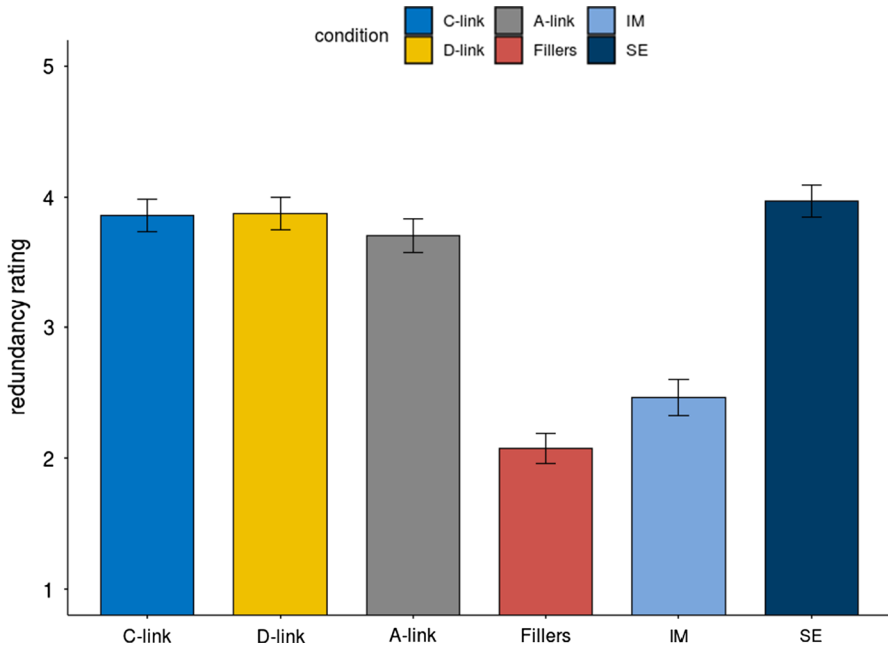
Fig. 4 Levels of redundancy (means) for specific links, implicatures, and semantic entailments

40.4% 'definitely yes', M = 3.88, SD = 1.03, W = 1606, $p < 0.001$; A-link: 34.6% 'rather yes' and 34.6% 'definitely yes', M = 3.71, SD = 1.06, W = 1356, $p < 0.001$, all tests Wilcoxon for H_0: $\mu = 3$). Furthermore, the pattern of results for conditionals is *far* different from the one concerning implicatures (IM vs C-link: U = 1830, $p < 0.001$; IM vs D-link: U = 1765, $p < 0.001$; IM vs A-link: U = 1836.5, $p < 0.001$, all tests paired Mann–Whitney U). In short, causal, deductive, and abductive specific links are definitely less reinforceable than conversational implicatures. Thus hypothesis (H4) has been confirmed.

Figures 3 and 4 show the results of all conditions giving a general comparison between specific links, implicatures, and semantic entailments.

A visual inspection already indicates that specific links—while being obviously much less reinforceable than implicatures—are non-reinforceable to the extent typical for semantic entailments. Although the number of 'definitely-yes' responses to the question on redundancy was greater in SE than in any of the conditions: C-link, D-link, A-link, the statistical analysis did not detect a significant difference between the mean levels of redundancy evaluation across all four conditions.

Finally, we can note that slightly fewer people chose the 'definitely-yes' answer in A-link than in C-link and D-link. This observation holds with respect to every of the two versions of our study that we conducted earlier. It suggests that causal and deductive entailments are more strongly associated by people with the semantic

meaning of 'if-then' than the abductive relation. However, the observed difference never reached any statistical significance.[17]

5.4 Discussion

The results of our experiment bring the following conclusions. Firstly, semantic entailments are non-reinforceable, as expected, while implicatures are reinforceable as their reaffirmation does not sound redundant to ordinary speakers. Secondly, the results suggest that causal, deductive and abductive links expressed by conditionals are not reinforceable. Furthermore, these types of links are almost similar to semantic entailments in the size of redundancy effects under reaffirmation.

Thus the test from reinforceability indicates that specific links are semantically expressed by a conditional statement. This outcome nicely corresponds to the other recent results of experimental research on conditionals discussed in Sect. 3 (e.g., Douven et al., 2018; Krzyżanowska & Douven, 2018; Skovgaard-Olsen, Collins, et al., 2019) and may be viewed as a development or another step of the project pursued by these authors. Not only the general inferential link, but also a more specific form of this link is a part of what is semantically expressed by a conditional utterance in a context. Our findings, in turn, point in a different direction than the one suggested by the earlier-mentioned studies which reported little effect, if any, of the connection between a conditional's subclauses to its acceptability (e.g., Oberauer et al., 2007). The results of those studies seemed to provide support for a theory saying that the link between a conditional's subclauses is not a part of its truth-conditional content. Our experiment provides a challenge for such a theory, which is to explain why specific links are nonetheless treated as a part of the truth-conditions of a conditional in a context.

Based on our findings, one may be tempted to say that they, in fact, provide evidence against those theories which deny that the link requirement is a part of the *lexical meaning* of conditionals (such as, for instance, the truth-functionalist view or the suppositional theory). However, we should be careful with such conclusions. Firstly, our results suggest that specific links do not arise in the way characteristic for conversational implicatures. But conversational implicatures may not be the only candidate for a pragmatic account of the links and perhaps the right pragmatic account has not been found as yet. Secondly, in order to establish the conclusion that specific links are semantic in a decisive way, one needs to conduct more linguistic tests of various kinds which would likewise confirm their semantic character. Finally, as we have already noted, our results pose a challenge to Gricean account of specific links and, in general, to the approaches which attempt to derive these links from conversational principles. Hence, the presented data—even if valid—may not refute the aforementioned theories of conditionals themselves, but only suggests that any such theory should incorporate essentially different mechanisms from the

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[17] It is also worth noting that our filler items obtained lowest redundancy ratings among all types of items in the study (M = 2.07, SD = 0.95, IM vs Fillers, paired Mann–Whitney U test: U = 598, p = 0.001). This was expected given that they were designed specifically to evoke this kind of judgment.

Gricean ones in order to account for specific links. In the next section, we will show how specific links can be accounted for as semantically relevant without abandoning standard semantic analyses of 'if-then' and this proposal will appeal to an important contemporary view of the boundary between semantics and pragmatics.

6 Specific links as semantically relevant: different theoretical explanations

In this last section, we discuss various possible analyses of specific links, according to which these links are semantically expressed by conditionals. Although some of these analyses are more preferable than others, we do not think that our empirical data decisively favors one particular approach.

6.1 Lexical ambiguity

To begin with, we want to consider the hypothesis that 'if-then' is lexically ambiguous and specific links are simply related to different meanings of that connective. (That is, 'if-then' has several meanings: in one sense, it is synonymous to the expression 'is a cause of', in the other sense, it means 'is evidence of', etc.) If this view is correct, it seems that 'if-then' should be conceived as *polysemous* rather than *homonymous*. It is because homonyms encode various unrelated meanings or their different denotations have nothing in common (cf. 'bank' or 'left'). The relations encoded by 'if-then' seem to have, in turn, something in common—at least, most of them are species of a broadly conceived relation of implying or entailing.

Although the view that 'if-then' exhibits semantic ambiguity is compatible with our empirical results, it does not seem to be the most appealing option. One problem is that given that there is a number specific links which can be conveyed by conditionals (cf. Björnsson, 2011), 'if-then' must actually suffer from an extreme ambiguity. Moreover, the list of potential relations which may hold between the antecedent and the consequent is presumably not-closed, or at least it would be very hard to enumerate *all* possible kinds of such relations. This is unusual, given that 'if-then' is a simple lexical ambiguity. Another challenge is to describe the evolution of polysemous meanings: which specific link would be the primary meaning and which links would be secondary meanings that have arisen from the primary one? All these difficulties indicate that the lexical-ambiguity approach is not wholly promising.

6.2 Possible-worlds semantics and 'indexicalist' approach

The second proposal is that 'if-then' is a context-sensitive expression whose semantic interpretation requires background assumptions. In particular, possible-worlds semantic accounts make room for such a treatment, as contextual information can be integrated by shaping the accessibility relation between worlds (see Lewis, 1975; Kratzer, 1981, 1986). We will illustrate this approach with a theory of Kratzer.

The main idea of Kratzer's account of 'if-then' is that it is not a sentential connective but a device to restrict (the domain of) various types of operators, e.g., adverbs of quantification, modal and probability operators. She postulates that even bare indicative conditionals can be analyzed according to the restrictor view. Apparent bare indicative conditionals contain an epistemic necessity modal (must) or a frequency operator (usually, always) in their logical form. For example, a sentence 'If the lights in his study are on, Roger is at home' involves an epistemic modal *must* ((MUST: the lights in his study are on) (Roger is at home)) and the sentence is true iff Roger is at home in all accessible worlds where the lights in his study are on (Kratzer, 2012, p. 98).

In the possible-worlds frameworks such as the one of Kratzer, we can treat specific links as truth-conditional components of conditionals. As we have already said, different assumptions about the context can be easily represented in terms of different relations between worlds. To the extent to which it is possible to tie specific links to conversational backgrounds, the nature of the link can be represented by choosing a particular accessibility relation. In particular, this analysis of conditionals may include a variable ranging over conversational backgrounds as syntactically represented in the logical form of a conditional. Different specific links could be then incorporated into the propositional content of a conditional by an index indicating the kind of a relation. On this 'indexicalist' approach, a specific link becomes then an essential component of a conditional's truth conditions, so the account is able to explain the non-reinforceable character of specific links.[18]

In sum, possible-worlds accounts of conditionals such as the one of Kratzer can explain specific links semantically—as related to the context of an utterance—which is standardly represented in these accounts in terms of relations restricting the relevant sets of worlds.

6.3 Contextualism

Finally, we want to consider a contextualist explanation of specific links. Generally speaking, various forms of the view labelled 'contextualism' claim that the propositional content of an utterance is determined in a significant way by different pragmatic factors and the influence of context is much more widespread and sophisticated than the traditional picture assumes (see Recanati, 2004, 2010; Korta & Perry, 2011). What is distinctive for this view is that the "intrusion" of the context does not proceed in a linguistically controlled way and thus is not restricted to the case of paradigmatic indexical expressions (like 'I', 'here', etc.). Roughly speaking, we can distinguish between 'radical' and 'moderate' contextualism. Radical contextualism claims that it is impossible to assign truth conditions to any sentence in isolation from the context. Moderate contextualism claims that indexical-free sentences have some minimal truth conditions, that is to say, the meanings of their constituents are

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[18] It is instructive to observe that our experimental materials contained examples with and without explicit modals. Kratzer's theory is flexible enough to deal with such examples.

sufficient to determine a unique proposition, but this proposition is not usually the one which is actually expressed by the speaker in a context.

Let us focus on moderate contextualism for a moment. Following Recanati (2010, 2013), we introduce the notion of 'modulation' which is a *primary* pragmatic process—i.e., the one which appeals to the context prior to determining the proposition expressed by the utterance and thus contributes to this proposition—and, at the same time, is not dictated by any specific linguistic rules. In other terms, modulation is not signal-driven, but context-driven, in the sense that it arises for purely pragmatic reasons in order to make sense of what the speaker is saying (cf. Recanati, 2010, p. 12). Among different kinds of modulation, we can distinguish 'free enrichment' and 'specification' illustrated with the following examples, respectively:

(14)   a. She took out the key and opened the door. (b. She took out the key and opened the door *using the key.*)

(15)   a. These apples are green. (b. These apples have a *green peel.*)

In both examples, the first sentence can be used to convey the content explicated in the parentheses, but these readings are not dictated by any specific linguistic rules. Particularly, by uttering (14a), the speaker may *enrich* the literal content by actually expressing (14b). The content of (15a) can be, in turn, *specificated* to the effect that the whole utterances expresses (15b). For moderate contextualists, both processes are optional in the sense that (14a) and (15a) have some "minimal" truth conditions, once we have fixed the semantic values of the indexical contained in these sentences. Yet, both processes affect these truth conditions in a significant way and so, in a context, these sentences may *semantically* express the contents (14b) and (15b) respectively.

Let us now go back to conditionals. Radical contextualism would claim that a sentence of the form 'If *p*, then *q*' does not have a specified truth-conditional content outside of a context. In other terms, the meaning of 'if-then' is insufficient to determine a unique proposition. Radical contextualism is proposed by Björnsson (2008, 2011). According to him, the meaning of 'if' is that it 'introduces a proposition without presenting it as true so that the main clause can be understood in a relation to it' (2011, p. 7). This relation, however, is underspecified and a conditional can express different connections between the constituent clauses in different contexts. Hence, a specific link simply exhausts the content of a conditional in a context: without the speaker specifying the relation, the conditional lacks truth conditions. From the viewpoint of radical contextualism, it is not surprising then that the respondents in our study found it strongly redundant to reaffirm specific links.

Moderate contextualism takes a somehow different approach towards conditionals. According to this view, conditionals have some truth conditions, that is, the meaning of 'if-then' suffices to determine a unique proposition literally expressed by a conditional. Presumably, this literal meaning (for the sake of convenience, call it 'IF') is captured by one of the classical semantic analyses of conditionals, e.g., the truth-functionalist or suppositional theory. However, these basic truth conditions—whatever they are—do not usually exhaust the content of a conditional uttered on a particular occasion. A moderate contextualist acknowledges that various processes

of modulation take place. In particular, we may appeal to free-enrichment or speci-fication, depending on which particular analysis of IF we adopt. Those who stick to one of the classical theories of conditionals can explain specific links in terms of free enrichment. That is to say, a conditional in a context may express an *enriched* content consisting of the proposition determined by IF plus the statement of a spe-cific link. For instance, a speaker may enrich the meaning of an utterance 'If *p*, *q*' so that it expresses the content equivalent to the conjunction of the minimal propo-sition encoded by the conditional and the proposition that *q* is a result of *p*. On the other hand, the proponents of inferentialism—who claim that the antecedent must be linked to the consequent in order for a conditional to be true—can explain specific links naturally in terms of specification. That is to say, a speaker specificates the general inferential content of a conditional to the effect that it expresses a particular kind of a relation between the antecedent and the consequent. And so while say-ing 'If *p*, *q*', the speaker may express a proposition equivalent to, e.g., '*q* can be deductively inferred from *p*'. This process would be similar to the one which leads from (15a) to (15b). In sum, different theories of conditionals can explain specific links on contextualist grounds by free enrichment or specification, at least. As these are primary pragmatic processes (i.e., specific links enter the proposition expressed), ordinary users of language should report redundancy at a high level when the links are reaffirmed.

In sum, different contextualist approaches to conditionals can explain the seman-tic character of specific links. The consequence (cost?) of this approach is to agree that pragmatics interferes greatly with determining the semantics of a sentence in a way that is not essentially controlled by linguistic conventions.

7 Summary

In this paper, we considered whether specific links are semantically expressed or rather pragmatically implicated by conditionals. We proposed the test from rein-forceability and applied it using an experimental method. In our study, we focused on a causal, deductive and abductive relation. We also tested the levels of reinforce-ability of conversational implicatures and semantic entailments. In line with theo-retical considerations, implicatures turned out to be strongly reinforceable while semantic entailments definitely not. The key finding of our research was that the three specific links conveyed by conditionals are non-reinforceable to the level similar to semantic entailments. Based on these results, we argued that the implica-ture-based account of specific links is wrong and these links must enter the widely construed semantic content of a conditional utterance. Next, we considered vari-ous accounts of this phenomenon rooted in different theoretical frameworks. These included: the lexical-ambiguity view, possible-worlds accounts à la Kratzer (in par-ticular, the 'indexicalist' analysis), and contextualist approaches to conditionals. As we observed, the first of these accounts is quite problematic. In our view, the other two are much more promising.

All in all, we conclude by saying that more data is needed in order to establish the thesis that specific links are genuinely semantic and, if yes, what kind of a semantic

phenomenon they are really akin to. Nonetheless, in light of the presented results, it is no longer easy to believe that they can be explained in a purely pragmatic way or with keeping the traditional sharp division between semantics and pragmatics.

Appendix

Context 1, "Party organizing"

[C-link]
Jessica and Jim are discussing who they are going to invite to their party next Saturday. Jim does not like Mr. and Mrs. Smith who are Jessica's colleagues so he does not want to invite them. However, Jessica is trying to persuade Jim that they should invite the Smiths and during the conversation she says: ''If we don't invite the Smiths, they will feel insulted. Not inviting them will result in this.''

[D-link]
Jessica and Jim are discussing who they are going to invite to their party next Saturday. They want to organize a small party and not invite more than 20 people. After they have drawn up the guest list, Jessica persuades Jim that they should also invite her colleagues, Mr. and Mrs. Smith. But Jim observes that they have already 20 people on their list and says: ''If we also invite the Smiths, this will make more than 20 guests. Inviting Smiths entails this.''

[A-link]
Jessica and Jim are discussing who they are going to invite to their party next Saturday. Jim does not like Mr. and Mrs. Smith who are Jessica's colleagues so he does not want to invite them. However, Jessica is trying to persuade Jim that they should invite the Smiths because she owes them a favour. She says: ''If I don't invite the Smiths, I will show myself to be ungrateful to them. Not inviting them will demonstrate my ingratitude.''

[SE]
Jessica and Jim are organizing a party next Saturday and they are discussing who they are going to invite. Jim does not really like Mr. and Mrs. Smith who are Jessica's colleagues so he does not want to invite them. However, Jessica is trying to persuade Jim that they should invite the Smiths and during the conversation she says: ''The Smiths have already invited me twice to their parties. I was a guest of Smiths two times already.''

[IM]
Jessica and Jim are organizing a party next Saturday and they want to invite a few friends. Jessica asks Jim whether they can also invite some colleagues of hers, in particular, Mrs and Mr Smith, as she and Jim have been to the Smiths

a couple of times. Jim responds: ''I really like the Smiths and they invited us every time they organized a party. We should definitely invite them''.

Context 2, "Cider"

[C-link]
Mary wants to make apple cider using apples she has in the pantry. However, she wants to do it only under the condition that all apples in the pantry are ripe. She asks her husband John to check the apples and do it very carefully. Mary says to John: ''If we add any unripe apples to the cider, it will be sour. Unripe apples will make the cider taste sour.''

[D-link]
Mary wants to make apple cider using apples she has in the pantry. However, she wants to do it only under the condition that all apples in the pantry are ripe. She asks her husband John to check the apples. There are exactly 30 apples in the pantry. John has checked 15 of them and tells Mary that they are ready for use. Yet, Mary says: ''But if you've checked only half of the apples, then you have not checked the rest of them. The fact that only half of apples have been checked entails that the rest of them remains unchecked.''

[A-link]
Mary wants to make cider using apples she has in the pantry. However, she wants to do it only under the condition that all apples in the pantry are ripe. She asks her husband John to check the apples and do it very carefully. John asks Mary how he can recognize whether an apple is ripe. Mary responds: ''If an apple is soft, it should be ripe. A soft apple indicates that it is a ripe one.''

[SE]
Mary wants to make cider using apples she has in the pantry. However, she wants to do it only under the condition that all apples in the pantry are ripe. She asks her husband John to check the apples and do it very carefully. Once John has finished checking the apples, Mary asks him whether they are all ripe and John replies: ''No, only some of the apples are ripe. Not all of them are ripe.''

[IM]
Mary wants to make cider using apples she has in the pantry, but only under the condition that all apples in the pantry are ripe. She asks her husband John to check the apples. John starts checking them and, so far, they are all ripe. But he hasn't finished checking all of them when Mary asks whether the apples are ripe. John replies: ''Well, some apples are ripe. I don't know yet whether all of them are ripe.''

Context 3, "School gossip"

[C-link]

Martha and Bob are school friends. One day, they are chatting together and sharing some gossip about their school. Bob tells Martha that her best friend Angelica is having an affair with one of the teachers. Martha has already known it and asks Bob not to reveal this news to anyone. She says to Bob: ''If people learn about this affair, Angelica will get into trouble. Such a revelation will get her into trouble.''

[D-link]
Martha and Bob are school friends. One day, they are chatting together and sharing some gossip about their school. Bob tells Martha that his best friend Angelica who used to be single has recently started dating an older student. Martha has not known this but she feels happy for Angelica. She says: ''If Angelica is dating this guy, she is no longer alone. The fact that she is going out with this guy means that she is not alone any longer.''

[A-link]
Martha and Bob are school friends. One day, they are chatting together and sharing some gossip about their school. Bob tells Martha that her best friend Angelica has been dating one of the teachers, but Martha has not known it. She asks him how he has got this news and Bob says that he saw them kissing the each other. Martha says ''If they were kissing, they must be having an affair. This kiss proves that they are having an affair.''

[SE]
Martha and Bob are school friends. One day, they are chatting together and sharing some gossip about their school. Bob tells Martha that her best friend Angelica has been dating one of the teachers, but Martha has not known it. She asks him how he has got this news and Bob says that he saw them kissing each other. He says: ''So, I know that are having an affair. And I believe this.''

[IM]
Martha and Bob are school friends. One day, they are chatting together and sharing some gossip about their school. Bob tells Martha that her best friend Angelica has been dating one of the teachers, but Martha has not known it. She asks him how he has got this news and Bob says that he has heard it from Fred but then he adds: ''Well, Fred believes that they are a couple. He does not know it for sure.''

Context 4, "Chocolate Labrador"

[C-link]
Thomas and Erica are a couple and they have a chocolate Labrador who has a great appetite. One Saturday, they decide to dine out and leave their dog alone at home. After coming back, Thomas realizes that all sweets from a plate standing on the coffee table are gone. He tells Erica that the dog has

eaten the sweets. Erica says: ''Oh, no! If the dog ate all the sweets, he will get sick. He will get ill as a result of eating all the sweets.''

[D-link]
Thomas and Erica are a couple and they have a chocolate Labrador who has a great appetite. One Saturday, they decide to dine out and leave their dog alone at home. After coming back, Thomas realizes that a few caramels that were on a plate on the coffee table are gone. He suspects the dog of eating them and tells Erica about it. She is not happy as sweets are bad for dogs. She says: ''If the dog had eaten caramels, he ate sweets. The fact that they were caramels means that they were sweets.''

[A-link]
Thomas and Erica are a couple and they have a chocolate Labrador who has a great appetite. One Saturday, they decide to dine out and leave their dog alone at home. After coming back, Thomas realizes that all the sweets from a plate standing on the coffee table are gone. He tells it to Erica and she says: ''Oh, no! If there are no sweets on the plate, the dog must have eaten them. The empty plate means that the dog wolfed down the sweets.''

[SE]
Thomas and Erica are a couple and they have a chocolate Labrador who has a great appetite. One Saturday, they decide to dine out and leave their dog alone at home. After coming back, Thomas realizes that a few chocolates and caramels that were a plate on the coffee table are gone. He says to Erica: ''I think that the dog ate all the sweets from the plate. And there was a plate with sweets.''

[IM]
Thomas and Erica are a couple and they have a chocolate Labrador who has a great appetite. One Saturday, they decide to dine out and leave their dog alone at home. After coming back, Thomas realizes that a few chocolates and caramels that were a plate on the coffee table are gone. He says to Erica: ''The sweets from the coffee table are gone and the dog is rubbing his muzzle. He has surely eaten them.''

Context 5, "Snack machine"

[C-link]
Jack is a first-year student and this is his first day in the dorm. His new friend Maggie has shown him how the vending machine in the hall works. The machine has different buttons with small pictures of different snacks. Pressing the button with an image of a given snack will make this kind of a snack fall out of the machine. Maggie says to Jack: ''If you press the button with a lollypop, then a lollypop falls out. Pressing the button will result in this.''

[D-link]

Jack is a first-year student and this is his first day in the dorm. His new friend Maggie showed him how the vending machine in the hall works. They have just eaten a big dinner but Jack says that he is still a little bit hungry. Maggie says to him: ''If you are still hungry, you haven't eaten enough. Your hunger means that the meal has not been big enough for you.''

[A-link]

Jack is a first-year student and this is his first day in the dorm. His new friend Maggie showed him how the vending machine in the hall works. The machine has different buttons with small pictures of different snacks. Jack presses the button with an image of a candy bar, but nothing happens. Maggie says to him: ''If the machine hadn't worked, you have probably forgotten to put a coin into it. The fact that the machine didn't work indicates this.''

[SE]

Jack is a first-year student and this is his first day in the dorm. His new friend Maggie has told him about the vending machine in the hall of their dorm. Jack asks Maggie what kinds of snacks the machine offers. She responds that he can mainly get sweets there and says: ''You will find candy bars, chocolates and some lollypops in the machine. And it offers lollypops.''

[IM]

Jack is a first-year student and this is his first day in the dorm. His new friend Maggie has told him about the vending machine in the hall of the dorm. Jack asks Maggie what kinds of snacks the machine offers and whether he can buy something that is not sweet. Maggie responds: "Most of the snacks offered by the machine are sweets. But the machine also has some snacks that are not sweet.''

Context 6, "Cinema affair"

[C-link]

Adam and Martha are students and they have been in a relationship for a long time. Martha's best friend is Alice. One day, Alice is chatting with her roommate and they share some gossip about Adam and Martha. At one point, the roommate says that she saw Adam at the cinema with a woman and that woman was not Martha. Alice gets upset and says: ''If Martha finds out that he has been cheating on her, she will be upset. This will make her upset.''

[D-link]

Adam and Martha are students and they have been in a relationship for a long time. Martha's best friend is Alice. One day, Alice is chatting with her roommate and they share some gossip about Adam and Martha. At one point, the roommate says that she saw Adam at the cinema with a woman and that woman was not Martha. Alice gets upset and says: ''If Adam is dating another

woman, he is cheating on Martha! The fact that he is going around with another woman means that he is a cheater.''

[A-link]
Adam and Martha are students and they have been in a relationship for a long time. Martha's best friend is Alice. One day, Alice is chatting with her roommate and they share some gossip about Adam and Martha. At one point, the roommate says that she saw Adam at the cinema with a woman and that woman was not Martha. Alice gets upset and says: ''If he takes another woman to the cinema, he may be cheating on Martha. This fact suggests that he is cheating.''

[SE]
Adam and Martha are students and they have been in a relationship for a long time. Martha's best friend is Alice. One day, Alice is chatting with her roommate and they share some gossip about Adam and Martha. At one point, the roommate says that she saw Adam in the cinema with a woman and that was not Martha. Alice gets upset and says: ''Perhaps Adam is cheating on Martha. He is perhaps a cheater.''

[IM]
Adam and Martha are students and they have been in a relationship for a long time. Martha's best friend is Alice. One day, Alice is chatting with her roommate and they share some gossip about Adam and Martha. At one point, the roommate says: ''Today I have seen Adam at the cinema with a woman. And that woman was not Martha.''

Context 7, "Planting vegetables"

[C-link]
Fiona and Marc are planting vegetables in the garden of their cottage house. They've already planted lettuce, cauliflower and zucchini. Fiona says that zucchini requires watering and asks Marc to run the garden hose, but he refuses to do it right away. Yet, Fiona insists and says: "If we don't water the zucchini plants immediately, they will not grow well. Not watering them will result in them growing poorly."

[D-link]
Fiona and Marc are planting vegetables in the garden of their cottage house. They've already planted lettuce, cauliflower and zucchini. Marc also wants to plant onions but Fiona says that it's better to do it in the autumn. Marc agrees and says that he will do it in October, and he adds, "If I do it in October, that will be in the middle of autumn. Planting in October means that it will be in the middle of autumn."

[A-link]

Fiona and Marc are planting vegetables in the garden of their cottage house. They've already planted lettuce, cauliflower and zucchini. Next weekend, when they come back to the their cottage house, they find that the zucchini plants have wilted. Fiona is upset and says to Marc "If the zucchini plants wilted, perhaps they have not received enough water. The fact that they have wilted indicates that they haven't been sufficiently watered."

[SE]
Fiona and Marc are planting vegetables in the garden of their cottage house. Marc has already planted lettuce, cauliflower and zucchini. Fiona says that zucchini requires water and asks Marc to run the garden hose. But Marc says: "I've already watered the planted zucchini with a watering can. And I have planted the zucchini."

[IM]
Fiona and Marc are planting vegetables in the garden of their cottage house. They've already planted lettuce, cauliflower and zucchini. Marc asks Fiona whether they should water the zucchini right now since it presumably requires a lot of water to grow well. Fiona responds: "You should run the garden hose now. We should definitely water the zucchini right now."

Context 8, "Dog show"

[C-link]
Alice and her son Arthur have come to a dog show. They are watching dogs of different breeds, which are presented in the rings. Right now, they are looking at Golden Retrievers and Arthur asks Alice whether he can give a dog snack to one of the Golden Retrievers. Alice says: "If you give one a snack, it will become your friend. Giving it a snack will result in that."

[D-link]
Alice and her son Arthur have come to a dog show. They are watching dogs of different breeds, which are presented in the rings. Arthur asks Alice how he can recognize a Dalmatian and she says that Dalmatians are white with black spots. But Arthur comments: ''If Dalmatians have black spots, they cannot be fully white. Having black spots entails that a Dalmatian is not wholly white."

[A-link]
Alice and her son Arthur have come to a dog show. They are watching dogs of different breeds, which are presented in the rings. Arthur is not familiar with dog breeds and asks Alice how he can recognize a Dalmatian and Alice says: "If the dog is white and has black spots and short fur, it is certainly a Dalmatian. White short fur with black spots surely means that it is a Dalmatian."

[SE]

Alice and her son Arthur have come to a dog show. They are watching dogs of different breeds, which are presented in the rings. Arthur is not familiar with dog breeds and asks Alice how he can recognize a Dalmatian and Alice says: "Dalmatian is white, has black spots and short fur. And its spots are black."

[IM]
Alice and her son Arthur have come to a dog show. They are watching dogs of different breeds which are presented in the rings. Right now, they are looking at Golden Retrievers and miniature Pinschers. After a moment, Alice asks Arthur whether he likes both Golden Retrievers and the Pinschers and he says: "I like the Golden Retrievers. I don't like the Pinschers."

Context 9, "Visiting grandma"

[C-link]
Anne and Philip are a couple and they are going to visit Philip's grandmother, who has a birthday today. Together they prepare a cake as a gift. Philip knows that his grandma loves dark chocolate and so he says to Anne: "If we put a lot of dark chocolate into the cake, the grandma will love it. Adding dark chocolate will have the effect that the grandma will like the cake."

[D-link]
Anne and Philip are a couple and they are going to visit Philip's grandmother, who has a birthday today. Together they prepare a cake as a gift. Philip asks Anne what she proposes to be the main ingredient and she says that it will be dark chocolate. Phillip comments: "Great! If we add dark chocolate as the main ingredient, it will be a chocolate cake. This fact entails that we'll have a chocolate cake."

[A-link]
Anne and Philip are a couple and they are going to visit Philip's grandmother, who has a birthday today. Together they prepare a chocolate cake as a gift. Philip tastes the cake and says that it is quite bitter. Anne responds: ''If the cake is bitter, I must have put too much dark chocolate inside. The bitter taste indicates this."

[SE]
Anne and Philip are a couple and they are going to visit Philip's grandmother, who has a birthday today. Together they prepare a cake as a gift. Philip asks Anne what she proposes to be the main ingredient and she says that it will be dark chocolate. Phillip comments: "Great! We will make a dark chocolate cake. And we will make a cake."

[IM]
Anne and Philip are a couple and they are going to visit Philip's grandmother, who has a birthday today. Together they prepare a cake as a gift. Philip asks

Anne what she proposes to be the main ingredient and she says: "For a couple of weeks now, I have really wanted to cook something with dark chocolate. Let's use dark chocolate."

Context 10, "Flat tire"

[C-link]
Peter and Penelope are travelling by car on a weekend trip. At one moment, Penelope, who is a passenger, observes that there is a lot of glass scattered on the right side of the road. Penelope warns Peter, who is driving the car, to be careful and she says: "If you drive into the glass, we may get a flat tire. Riding onto the glass may result in a flat tire."

[D-link]
Peter and Penelope are travelling by car on a weekend trip. At one moment, Peter who is driving, feels that he is losing control of the car and stops on the side of the road. Penelope says that she saw some glass scattered on the road some time ago. Before he gets out of the car, Peter says: "Oh no! If there is a piece of glass in the tire, the tire is damaged. Glass in the tire means a damaged tire."

[A-link]
Peter and Penelope are travelling by car on a weekend trip. At one moment, Peter who is driving, feels that he is losing control of the car and stops on the side of the road. Peter gets out of the car and sees that one of the tires is flat. Penelope says to Peter: "If the tire is flat, we have probably driven over a spike. The flatness of the tire suggests that there is a spike in it."

[SE]
Peter and Penelope are travelling by car on a weekend trip. At one moment, Peter who is driving, feels that he is losing control of the car and stops on the side of the road. Peter gets out of the car and sees that one of the tires is flat. Peter says to Penelope: "Unfortunately, the front-left tire is flat. On the front-left side, we have a flat tire."

[IM]
Peter and Penelope are travelling by car on a weekend trip. At one moment, they take a break and stop at a parking near the highway to eat something at the parking restaurant. Peter goes first to the restaurant while Penelope takes a short walk in the parking. When she joins Peter at the restaurant, she says: "A car on the parking has a flat tire. It is not our car."

Fillers

"Mower"
Ruth and Ronald are tiding up the garden in front of their house. As the grass has grown a little bit, Ronald suggests that he will cut it down and asks Ruth

where they keep a small electric mower. Ruth responds: "If the mower is not in the cupboard in the entrance hall, it should be in the garage. You can also check in the shed at the back of the house."

"Tennis"
Jane and Jeremy are playing tennis on a Saturday afternoon. Since it is quite hot, after an intensive match Jane proposes that she will go and buy some cold drinks and snacks. She asks Jeremy what he would like to get and he says: "If they have cold blackcurrant juice, you can buy me one. Also, buy me a tuna sandwich, please."

"Wedding"
Emily and Ethan are at the wedding cake tasting. At the moment, they are trying two flavors: a sour cherry cake and a sweet raspberry cake. Ethan tastes both cakes. However, he cannot tell the difference between them and he says to Emily: "This raspberry cake tastes exactly like the cherry cake. I do not feel any difference between them."

"Chess"
Margaret and Ralph are watching an old set of wooden chess pieces. They admire the antique style of the pieces and their ornaments. Moreover, Margaret explains the rules of the game to Ralph since he does not know much about playing chess. At one moment, Margaret says to Ralph: "The moves of the knight form an "L"-shape. It is the only piece that can leap over other pieces."

"Psychotherapy"
Tom and Tina participate in a partner therapy. They have been married for ten years and they are currently undergoing a crisis in their marriage. One time, Tom tells the psychotherapist about his and Tina's last quarrel and how hurtful she was to him. The therapist says to Tina: "If you feel neglected by your husband, your emotions take control over your behavior. We can't do anything about emotions, we are just humans."

References

Adams, E. (1975). *The logic of conditionals*. . Reidel.

Bach, K. (2005). The top 10 minconceptions about implicature. In *Festchrift for Larry Horn*. John Benjamins.

Beaver, D. I., & Geurts, B. (2014). Presupposition. In E. N. Zalta (ed.), *The Stanford encyclopedia of philosophy* (Winter 2014 Edition). https://plato.stanford.edu/archives/win2014/entries/presupposition/.

Bennett, J. (2003). *A philosophical guide to conditionals*. . Clarendon Press.

Björnsson, G. (2008). Strawson on 'if' and hook. *South African Journal of Philosophy, 27*(3), 24–35.

Björnsson, G. (2011). Towards a radically pragmatic theory of if-conditionals. In K. Turner (Ed.), *Current research in the pragmatics/semantics interface. Making semantics pragmatics* (Vol. 24). Brill Academic Publishers

Cruz, N., Baratgin, J., Oaksford, M., & Over, D. (2015). Bayesian reasoning with ifs and ands and ors. *Frontiers in Psychology, 6*, 192.

Cruz, N., Over, D., Oaksford, M., Baratgin, J., (2016). Centering and the meaning of conditionals. In A. Papafragou, D. Grodner, J.C. Mirman & Trueswell (Eds.), *Proceedings of the 38th annual conference of the cognitive science society* (pp. 1104–1109). Austin, TX.

Douven, I, Elqayam, S., Singmann, H., & van Wijnbergen-Huitink, J. (2018). Conditionals and inferential connections: A hypothetical inferential theory. *Cognitive Psychology, 101*, 50–81.

Douven, I, Elqayam, S., Singmann, H., & van Wijnbergen-Huitink, J. (2019). Conditionals and inferential connections: toward a new semantics. *Thinking & Reasoning*. https://doi.org/10.1080/13546783.2019.1619623 (cited via: https://www.researchgate.net/publication/333964100).

Douven, I., & Verbrugge, S. (2010). The Adams family. *Cognition, 117*, 302–318.

Dunn, J. M., & Restall, G. (2002). Relevance logic and entailment. In F. Guenthner & D. Gabbay (Eds.), *Handbook of philosophical logic.* (Vol. 6, pp. 1–128). Kluwer.

Edgington, D. (2007). On conditionals. In D. M. Gabbay & F. Guenthner (Eds.), *Handbook of philosophical logic.* (Vol. 14, pp. 127–221). Kluwer.

Grice, P. H. (1989). *Studies in the way of word.* . Harvard University Press.

Horn, L. (1972). *On the semantic properties of the logical operators in English*. Ph.D. Dissertation UCLA. Distributed by Indiana University Linguistic Club, 1976.

Horn, L. (1991). Given as new: When redundant affirmation isn't. *Journal of Pragmatics, 15*, 313–336.

Johnson-Laird, P. N., & Byrne, R. M. J. (2002). Conditionals: A theory of meaning, pragmatics, and inference. *Psychological Review, 109*, 646–678.

Karttunen, L. (1973). Presuppositions of compound sentences. *Linguistic Inquiry, 4*, 167–193.

Korta, K., & Perry, J. (2011). *Critical pragmatics. An inquiry into reference and communication*. . Cambridge University Press.

Kratzer, A. (1981). Partition and revision: The semantics of counterfactuals. *Journal of Philosophical Logic, 10*(2), 201–216.

Kratzer, A. (1986). Conditionals. *Chicago Linguistics Society, 22*(2), 1–15.

Kratzer, A. (2012). *Modals and conditionals*. . Oxford University Press.

Krzyżanowska, K., Collins, P., & Hahn, U. (2017). Between a conditional's antecedent and its consequent: Discourse coherence vs. probabilistic relevance. *Cognition, 164*, 199–205.

Krzyżanowska, K., & Douven, I., (2018), Missing-link conditionals: Pragmatically infelicitous or semantically defective. *Intercultural Pragmatics* 15, 191–211. cited via: http://karolinakrzyzanowska.com/pdfs/MissingLink.pdf.

Krzyżanowska, K., Wenmackers, S., & Douven, I. (2014). Rethinking Gibbard's riverboat argument. *Studia Logica, 102*(4), 771–792.

Levinson, S. (2000). *Presumptive meanings: the theory of generalized conversational implicature. Language, speech, and communication*. Cambridge: MIT Press.

Lewis, D. (1975). Adverbs of quantification. In Edward Keenan (Ed.), *Formal semantics of natural language* (pp. 3–15). Cambridge University Press.

Mares, E. D., & Fuhrmann, A. (1995). A relevant theory of conditionals. *Journal of Philosophical Logic, 24*, 645–665.

Meyer, M-Ch. (2015). Redundancy and embedded exhaustification. In S. D'Antonio, M. Moroney, & C. R. Little (Eds.), *Semantics and linguistic theory* (SALT) 25.

Nolan, D. (2003). Defending a possible-worlds account of indicative conditionals. *Philosophical Studies, 116*, 215–269.

Oberauer, K., Weidenfeld, A., & Fischer, K. (2007). What makes us believe a conditional? The roles of covariation and causality. *Thinking and Reasoning, 13*, 340–369.

Over, D. E., Hadjichristidis, C., Evans, J. S. B. T., Handley, S. J., & Sloman, S. A. (2007). The probability of causal conditionals. *Cognitive Psychology, 54*(1), 62–97.

Recanati, F. (2004). *Literal meaning*. . Cambridge University Press.

Recanati, F. (2010). *Truth-conditional pragmatics*. . Oxford University Press.

Recanati, F. (2013). Précis of 'Truth-conditional pragmatics.' *Teorema, 32*(2), 57–63.

Rieger, A. (2013). Conditionals are material: The positive arguments. *Synthese, 190*(15), 3161–3174.

Routley, R., Meyer, R. K., Plumwood, V., & Brady, R. (1983). *Relevant logics and its rivals*. . Ridgeview.

Sadock, J. M. (1978). On testing for conversational implicature. In P. Cole (Ed.) *Syntax and semantics*, vol. 9 *Pragmatics*. Academic Press.

Skovgaard-Olsen, N., Collins, P., Krzyżanowska, K., Hahn, U., & Klauer, K. C. (2019). Cancellation, negation, and rejection. *Cognitive Psychology, 108*, 42–71.

Skovgaard-Olsen, N., Kellen, D., Hahn, U., & Klauer, K. C. (2019). Norm conflicts and conditionals. *Psychological Review, 126*(5), 611–633.

Skovgaard-Olsen, N., Kellen, D., Krahl, H., & Klauer, K. C. (2017). Relevance differently affects the truth, acceptability, and probability evaluations of 'and', 'but', 'therefore', and 'if then.' *Thinking and Reasoning, 23*(4), 449–482.

Skovgaard-Olsen, N., Singmann, H., & Klauer, K. C. (2016). The relevance effect and conditionals. *Cognition, 150*, 26–36.

Spohn, W. (2013). A ranking-theoretic approach to conditionals. *Cognitive Science, 37*, 1074–1106.

Stalnaker, R. (1968). A theory of conditionals. In *Studies in logical theory*, *American Philosophical Quarterly*, Monograph Series 2 (pp. 98–112). Blackwell.

Stalnaker, R. (1979). Assertion. *Syntax and Semantics, 9*, 315–332.

Strawson, P. (1986). 'If' and hook. In R. Grandy, & R. Warner (Eds.), *Philosophical grounds of rationality: Intentions, categories, ends* (pp. 229–42). Clarendon Press.

Vidal, M. (2017). A compositional semantics for 'even-if' conditionals. *Logic and Logical Philosophy, 26*, 237–276.

Vidal, M., & Baratgin, J. (2017). A psychological study of unconnected conditionals. *Journal of Cognitive Psychology, 29*, 769–781.

von Fintel, K., & Gillies, A. S. (2010). Must…stay…strong! *Natural Language Semantics, 18*(4), 351–383. https://doi.org/10.1007/s11050-010-9058-2.

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