Between "If" and "Then."
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This dissertation concerns the meaning of conditional sentences in natural language. Our philosophical investigations have been aided by linguistic considerations and empirical results from the psychology of reasoning. We have argued that only by combining the insights from different disciplines, one can arrive at an account that fulfils all the theoretical desiderata and, at the same time, fits the over-the-years collected data on how people use and interpret conditional sentences. Now it is time to see where this approach has lead us to. Section 6.1 will recapitulate the outcome of our attempt to develop such an account.

The word “attempt” in the above sentence has been chosen deliberatedly, as the proposal presented in this dissertation is by no means the end of the story. On the contrary, even though a dissertation marks a conclusion of one’s doctoral project, it is really only a prologue. Not surprisingly, in the course of the investigation, many new questions have arisen. Perhaps even more questions than we were concerned with at the beginning of the project. In section 6.2, we will outline the perspectives for future research.

6.1 Summary

In chapter 1, we described our goal of developing an empirically informed theory of conditionals. We have noted that understanding what are the conditions for conditional sentences to be true amounts to answering the question of what we learn when we are given a piece of information phrased as an indicative conditional. Our starting point was an observation that the Ramsey Test, which is considered by many scholars to be an accurate description of a mechanism underlying the interpretation of conditional sentences, provides only a partial answer to the question of their meaning.

Chapter 2 discussed the two most prominent approaches towards the semantics of conditional sentences: the material conditional account and Stalnaker’s possible worlds semantics, whose counter-intuitive consequences eventually motivated our own in-
vestigations. In particular, we have seen that conditionals with true antecedents and true consequents, for instance:

(67) a. If aubergine is a vegetable, then raccoons are American mammals noted for their intelligence.

b. If it sometimes rains in Groningen, then Kazimierz Ajdukiewicz was a prominent Polish philosopher.

c. If Shakespeare did not write Anna Karenina, then Ljubljana is the capital of Slovenia.

are rendered true on both the material interpretation and on Stalnaker’s account, regardless of whether these sentences make any sense at all. We have argued that this kind of problem stems from the fact that none of these theories managed to account for what, in our opinion, seems to be the main message conveyed by conditional sentences, namely, that there is a particular connection between antecedents and consequents.

In chapter 3, we have presented a semantics based on an observation that the link between a conditional’s antecedent and its consequent is inferential in nature. Moreover, the consequence relation connecting the clauses of a conditional sentence does not always have to be of the same type. Many, if not all, indicative conditionals can be grouped into deductive, inductive or abductive inferential (DI, II and AI, respectively) conditionals (cf. definitions 1 and 2). On the basis of this observation, we have proposed the following truth conditions:

**Definition 3:** A speaker S’s utterance of “If $\varphi$, $\psi$” is true if and only if:

(i) $\psi$ is a consequence of $\varphi$ in conjunction with S’s background knowledge,

(ii) $\psi$ is not a consequence of S’s background knowledge alone but not of $\varphi$ on its own, and

(iii) $\varphi$ is deductively consistent with S’s background knowledge or $\psi$ is a consequence of $\varphi$ alone,

where the consequence relation can be deductive, abductive, inductive, or mixed.

Consequently, we have shown that the proposed semantics evades the paradoxes of material implication, and, that it validates a highly regarded principle of Import-Export. We have also argued
that, even though the Or-to-if and Modus Ponens inferences are not valid on our account, the semantics renders the conclusions of these two argument forms true precisely in the cases in which, intuitively, they need to be true.

Chapter 4 reports the results of two experiments that provided empirical support for the typology of conditionals introduced in chapter 3 and thereupon based semantics. We have investigated the relationship between Dutch and English evidential markers and the inferential conditionals of different types. In particular, we have examined how the assertability of a conditional changes when markers “should,” “must” or “probably” in the English version of the experiment, and, in the Dutch version of the experiment, “zou moeten,” “moet” and “waarschijnlijk” are inserted into the consequent of that conditional. The results of the two experiments support the hypothesis that English modal verb “should” and its Dutch equivalent, “zou moeten,” function as evidential markers of inductive inference. Moreover, our studies suggest that the English modal verb “must” and its Dutch counterpart, “moet,” serve as abductive inferential markers. Unsurprisingly, English “probably” as well as its Dutch translation, “waarschijnlijk,” can be thought of as markers signalling the uncertainty of what is asserted. We take these results to be a piece of evidence for the descriptive accuracy of our proposal.

In chapter 5, we put the theory proposed in chapter 3 to a philosophical test. We analysed an argument by Gibbard (1981) who purported to show that indicative conditionals cannot express propositions. The argument militates against those propositional theories of conditionals that validate the Principle of Conditional Non-Contradiction, which is often regarded as an adequacy constraint on any theory that attributes truth-conditions to conditional sentences. According to this principle, “If \( \varphi \), \( \psi \)” and “If \( \varphi \), not \( \psi \)” cannot both be true (unless \( \varphi \) is impossible). Gibbard described a scenario in which a pair of conditionals appears to violate the principle. However, we have argued that Gibbard’s conclusion is too rash since, in the light of our proposal, the violation of Conditional Non-Contradiction is only apparent. We have emphasised the role the speaker’s background knowledge plays in determining the meaning of a conditional sentence. Yet we have argued that our semantics prevents us from falling into the problem of extreme subjectivity of meaning of conditional sentences, as it allows to explain how a person can interpret a conditional message without having access to the utterer’s epistemic states. Furthermore, we reported the results of an experiment provid-
ing further support for our diagnosis. Finally, Gibbard’s story has served as an illustration of a problem that indicative conditionals can pose to a deliberating agent (DeRose 2010). We have shown that our analysis of Gibbard’s scenario can serve also as a solution to the problem of deliberationally useless conditionals. In particular, acknowledging the fact that indicative conditionals can express various types of inferential relations helps to recognise the subclass of indicative conditionals which should be forgone in the process of decision making, namely, the conditionals of abductive inferential type.

Before we proceed with discussing the perspectives for further investigations, we should tackle one of the issues that opponents of our account may wish to raise. We have noted in the introductory chapter that the Ramsey Test provides a descriptively adequate account of how people decide whether or not to accept a conditional sentence. One could ask what is left from the Ramsey Test in our proposal. The semantics introduced in chapter 3 is build upon an idea that a conditional sentence conveys the existence of a link between its antecedent and the consequence, while the Ramsey Test does not call for any connection between the clauses of conditional sentences. However, we are of the opinion that the Ramsey Test is compatible with our proposal. By specifying the truth conditions of conditional sentences in correspondence to various consequence relations that can link their antecedents and consequents we did not violate the Ramsey Test. After all, on the account proposed in this dissertation, a consequent of a true conditional should also be considered true (or highly likely) on the supposition that its antecedent is true. In other words, true conditionals pass the Ramsey Test. Nonetheless, the converse does not hold—not all conditionals that pass the Ramsey Test will be true on our proposal: that $\psi$ is true (or highly likely) on the supposition that $\phi$ is not sufficient for the truth of “If $\phi$, $\psi$.” There is no reason, though, to believe that this alone conflicts with the spirit of the Ramsey Test.

6.2 Perspectives for Future Research

The proposal developed in this dissertation leaves many interesting questions unanswered. There are plenty of lines along which the follow-up investigations can be carried out. Some of these lines lie within the scope of philosophy of language or epistemo-
logy, while others belong to the domain of linguistics, the psychology of reasoning and cognitive science.

A philosopher of language or a semanticist might wish to see our proposal to be developed into a full-fledged formal semantics. In linguistics, a standard way to proceed would be to adapt the model-theoretic framework of possible worlds semantics. It is not yet clear, however, how to accommodate the variety of consequence relations by model-theoretic means. For instance, for the sake of modelling counterfactual conditionals in terms of causal dependencies, Schulz (2011) and Kaufmann (2013) have proposed semantic theories in the tradition of Kratzer (1979, 1986) enriched by the idea of causal networks developed by Pearl (2000). Perhaps the semantics for indicative conditionals could be extended in an analogous way. Or perhaps we should consider entirely different approach to semantic theory. For instance, a proof-theoretic semantics, belonging to the philosophical framework of inferentialism (Brandom 2000), might turn out to provide just the right tools for modelling inferential conditionals (see Schroeder-Heister 2014 for an overview). The Ramsey Test, on the other hand, which specifies a procedure for fixing one’s degree of belief in a conditional, might be taken to suggest the need for a procedural perspective on meaning (e.g. Tichý 1969, see also Szymanik 2009).

There are more issues of interest to philosophers of language and linguists which were not tackled in this dissertation. For instance, we have not explored the relationship between conditionals and epistemic modals in any great detail, even though our results offer some insight into the meaning of epistemic “should” and “must”. More precisely, we have not discussed the semantic differences between conditionals with a marker inserted in their consequents and the same conditionals without any marker. Is an II conditionals with “should” inserted into its consequent still an II conditional? If the uncertainty of the conclusion is made explicit, the inference could be construed as certain. For example, I might assert “It is the case that $\varphi$” as an inductive generalisation. This means that I am quite confident but not entirely certain that my assertion is true. On the basis of the same background knowledge, I might assert “It should be the case that $\varphi$.” In this case, even though I came to the belief that $\varphi$ by means of induction, I can be entirely certain about my assertion. This seems to be the case because I have encoded the information about my uncertainty and about the evidential grounds for my assertion in the linguistic expression I chose to use. Does it mean, then, that a conditional with an evidential marker signalling the presence of
an uncertain inference is itself a DI conditional? Perhaps. And perhaps the consequent of an AI or an II conditional is always within the scope of an epistemic modal in its evidential role, only this modal, at least in the languages unequipped with proper evidential systems, is not always explicit? A related question concerns the interpretation of a conditional without an explicit marker: Is there a default interpretation? Or a hierarchy of meanings analogous to what has been found in the context of quantified reciprocal sentences (Szymanik 2010). These and many other interesting nuances clearly require further investigations.

Furthermore, it still remains to be seen whether our proposal applies to the class of left-nested conditionals, which seem to notoriously escape generalisations (see, e.g., Dietz and Douven 2010). Prima facie, there is nothing bizarre in thinking about conditionals in terms of inferential relations connecting their antecedents and consequents even if their antecedents are themselves conditionals. After all, it is rather common for arguments to have conditional premises. However, it is not clear whether any inferential conditional can be taken as an antecedent, or how the embedding of different inferential conditionals may affect the interpretation of the sentence as a whole. This relates to the issue of learning conditional information (Douven 2012a). Does our theory shed any light on the still insufficiently explored issue of how people adjust (and how rational agents should adjust) their beliefs upon learning a conditional? And can our proposal explain the data on how people reason with conditional sentences? For instance, could the evaluation of various valid and invalid conditional argument forms depend on the inference relation expressed by a conditional? These questions need to be tackled both theoretically and empirically before we can fully evaluate the significance of our proposal.

Another matter without which our proposal may strike one as being incomplete concerns the probabilities of conditionals. Can we explain the data on how people assign probability values to conditional sentences? We have argued that the theory presented in this thesis is not at odds with the Ramsey Test, and hence, in principle, we could simply follow the test in determining our degrees of belief. Yet one could ponder over a question whether our truth-conditional theory could be reconciled with the famous triviality results of Lewis (1976) and others. According to a widely accepted interpretation of Lewis’ proofs, the thesis that the probability of an indicative conditional equals the probability of its consequent conditional on its antecedent, frequently referred to
as “the Equation,” can only hold if conditionals do not express propositions. Given the intuitive appeal of the Equation, the triviality results seem to pose a threat to any account on which conditionals can be true or false, including the one presented in this dissertation. Nevertheless, recent developments suggest that rejecting all propositional theories of conditionals might have been too rash a conclusion. For instance, Égre and Cozic (2011) propose a version of the Equation derived from the Lewis-Kratzer analysis of if-clauses as domain restrictors and argue that the triviality result may be seen as a result of inexpressibility. Moreover, Douven and Verbrugge (2013) report empirical results which challenge the assumptions of all triviality proofs. This means that we do not need to immediately proceed with rejecting our proposal on the basis of the alleged untenability of one of its most fundamental premises.

We have noted in the introduction that philosophers concerned with conditionals have come to the point where “every theory faces a counterexample, every argument has its counterargument, and every solution seems to give rise to an avalanche of new problems.” It is beyond question that some of the answers our proposal has provided might appear unsatisfactory, and some of its features may turn out to spark even more problems than we were trying to solve. However, we do hope to have taken a step forward towards a better understanding of what conditional sentences are.