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DISSEMINATION CORNER

The Logic of Conceivability

RECENT OUTPUT Since our last post in *the Reasoner's* Dissemination Corner, the [Logic of Conceivability Project \(LoC\)](#) conceived and realised a number of papers. Franz' 'Taming the Runabout Imagination Ticket' appeared in *Synthese* (2018), 'The Theory of Topic-Sensitive Intentional Modals' in *The Logica Yearbook 2018*, and his joint



work with Peter, 'Knowability Relative to Information,' in *Mind* (2018). Aybuke's 'A Topological Approach to Full Belief,' in collaboration with A. Baltag, N. Bezhanishvili, and S. Smets, has appeared in *Journal of Philosophical Logic* (2018), while Karolina's joint work with Niels Skovgaard-Olsen, Peter Collins, Ulrike Hahn, and Karl Christoph Klauer is forthcoming in *Cognitive Psychology*. Finally, Franz' book with Mark Jago, *Impossible Worlds*, will appear in 2019 (Oxford University Press).

The LoC researchers have meanwhile turned their attention to the notion of relevance between a conditional antecedent and its consequent. Here I survey some of the developments that sparked our interest in this phenomenon.

THE RELEVANCE OF RELEVANCE One of the aims of LoC is to study how people reason when they imagine non-actual situations, that is, when they think about what might happen or what might have happened. Among others, this kind of reasoning plays an important role in our production and interpretation of indicative conditionals, such as: "If you publish in good journals, you will get tenure" or "If we do not reduce our green house gas emission, the climate change catastrophe is inevitable." One aspect of the interpretation of conditionals that became LoC's focus is the connection between a conditional's antecedent and its consequent. This connection can be understood in various ways, for instance, as an evidential or inferen-

tial relation, as a causal or explanatory link, or as probabilistic relevance. There remains, however, a more fundamental question pertaining to the nature of the connection: does it belong to the (broadly construed) semantics of a conditional or is it merely a pragmatic aspect of its meaning?

On the vast majority of theories of conditionals, the connection plays no role in determining the truth value or the acceptability value of a conditional. On those theories, if the significance of the intuition that the antecedent and consequent should be connected is acknowledged at all, it is considered to be a purely pragmatic phenomenon. Nonetheless, it is not an entirely new idea that the connection belongs to what is literally said: the conventional, semantic content of a conditional, and hence that it contributes to its truth or acceptability conditions. The view that the consequent should be *inferrible* from the antecedent has been advocated, for instance, already in *A System of Logic* by John Stuart Mill (1843). The 20th century has witnessed attempts to capture the connection between antecedents and consequents in a formal system, such as relevance logics or Barwise and Perry's situation semantics, but none of these became mainstream. What triggered a new wave of interest in the status of the connection between antecedents and consequents have been recent developments in cognitive science.

The first bits of evidence for the "inferential" approach to conditionals can be found in the work by Douven and Verbrugge (2010: '[The Adams Family](#)', *Cognition*), who have drawn directly from the empirical linguistics, such as, for instance, the corpus based analysis of conditionals in English by Declerck and Reed (2010: *Conditionals: A comprehensive empirical analysis*, Mouton de Gruyter), where different types of conditionals sentences are characterised in terms of different kinds of relations connecting their antecedents and consequents. Taking the notion of an inferential conditional as their starting point, Douven and Verbrugge investigated how different types of the inferential link between antecedents and consequents affect people's acceptability and probability ratings. More specifically, they investigated different versions of the so-called Adams Thesis, according to which the *acceptability* of a conditional is governed by the conditional probability of its consequent given the antecedent. Although the Adams Thesis has been widely accepted as self-evident, it turned out not to hold as a general rule. At best, one can argue that the acceptability of a conditional correlates with the corresponding conditional probability. However, by classifying conditionals depending on the type of an inference they express—following the philosophical tradition of classifying inferences as deductive, inductive, and abductive—Douven and Verbrugge obtained positive results, too. For *deductive inferential conditionals*, the strongest version of the thesis holds: the acceptability of a conditional approximately equals the corresponding conditional probability. For the *abductive inferential conditionals*, a high correlation between the two measures has been observed, while in the case of *inductive inferential conditionals* we can only talk about moderate correlation. Building upon Douven and Verbrugge's study, Krzyżanowska, Wenmackers, and Douven (2013: '[Inferential conditionals and evidentiality](#)', *Journal of Logic, Language and Information*, 22(3), 315-334) showed that the type of an inferential connection between antecedents and consequents does not only affect the strength of the correlation between the acceptability and conditional probability, but it also affects the way conditionals interact with epistemic modals inserted in their consequents.

While the results due to Douven and Verbrugge highlight the significance of the connection between antecedents and consequents for people's interpretation of conditional sentences, they do not allow us to conclude anything about its status as a semantic or pragmatic aspect of their meaning. More recent results, however, suggest that the connection should at least be considered as belonging to the conventional content of conditionals, if not even its truth-conditional content. Skovgaard-Olsen, Singmann, and Klauer (2016: 'The relevance effect and conditionals,' *Cognition*, 150, 26-36) showed that the connection, understood in the probabilistic terms as the antecedent's probability raising effect on the consequent (so called *probabilistic relevance*) affects people's probability ratings. More specifically, Skovgaard-Olsen et al. (2016) investigated the thesis, typically referred to as *The Equation*, that the probability of a conditional equals the corresponding conditional probability. While it is believed to be the most robust finding about indicative conditionals, the Equation turned out not to hold for all conditionals, but only for those whose antecedents are relevant for the consequents.

Another line of empirical research that motivates the semantic approach to the connection between antecedents and consequents does not concern the semantic content of a conditional directly, but it shows that a purely pragmatic treatment of the connection is problematic. For instance, Krzyżanowska, Collins, and Hahn (2017: 'Between a conditional's antecedent and its consequent: Discourse coherence vs. probabilistic relevance,' *Cognition* 164, pp. 199–205) show also that the oddity of missing-link conditionals is not due to the violation of discourse coherence, that is, that the connection between the clauses of a conditional needs to be something stronger than the common topic understood in discourse-coherence-theoretic terms. Furthermore, the forthcoming paper by Skovgaard-Olsen, Collins, Krzyżanowska, Hahn, and Klauer (2019: 'Cancellation, negation, and rejection,' *Cognitive Psychology* 108: 42-71) shows that the connection cannot be a conversational implicature since a speaker attempting to cancel it is judged by the participants as contradicting themselves. The oddity of conditional's without a connection is also not an instance of a presupposition failure, since it does not project under wide scope negation. Moreover, it does appear to belong to the at-issue content. While the possibility that the connection is a conventional implicature is still open, making it a semantic, but not truth-conditional content, a recent work by Douven, Elqayam, Singmann, and van Wijnbergen-Huitink (2018: 'Conditionals and inferential connections: A hypothetical inferential theory,' *Cognitive Psychology* 101, pp. 50-81) provides evidence that the presence and the strength of an inferential connection affects people's truth value judgements, too.

Given the close relationship between conditionals and hypothetical reasoning, these results are not surprising: after all, in the process of hypothetical thinking, people tend to be interested in the consequences of what they suppose that are related to their suppositions, not merely in things that happen to be true when these suppositions hold. How to exactly account for this phenomenon is an exciting research question that we hope to answer. Stay tuned!

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