

Iterated conditionals. As ordinary as can be?

1. Researchers involved

Shira Elqayam

De Montfort University, Leicester

selqayam@dmu.ac.uk

Janneke Huitink

Institute for Cognitive Linguistics, University of Frankfurt

janneke.huitink@gmail.com

David Over

Department of Psychology, Durham University

david.over@durham.ac.uk

2. Project summary

The aim of this project is to investigate whether human beings can cope with successive embeddings of hypotheses, which is reflected in *iterated conditionals* like:

- (1) If the light will go on if you press the switch, the electrician has called.

Starting point are two opposing theories about the interpretation of conditionals. The first theory maintains that conditionals are ordinary semantic creatures that *have full truth conditions* in the same way that familiar conjunctions with ‘and’ or ‘or’ have truth conditions (Stalnaker 1968, Lewis 1973). The rival theory rests on suggestions originally made by Ramsey (1931) and de Finetti (1937/1964) and argues that conditionals are special semantic beasts that *lack full truth conditions*. Instead, conditionals express a high probability of the consequent given the antecedent (Adams 1998, Gibbard 1981, Edgington 1995). Of the researchers involved, Huitink can be classified a Stalnaker-Lewis-person (see Huitink 2008), while Elqayam and Over tend more towards the Adams-style probability theory (see Evans & Over 2004, Elqayam *et al.* 2006).

The two theories make conflicting predictions about iterated conditionals like (1). According to truth-conditional theories, *conditionals can freely be iterated*, and iterated conditionals do not pose any semantic difficulties. In contrast, the conditional probability theory *precludes iteration*. If iterated conditionals are intelligible, this must be due to some *ad hoc* interpretation strategy, where the embedded conditional is substituted for a factual sentence. So, when hear (1), we understand it as (cf. Edgington 1995):

- (2) If the power is on, the electrician has called.

Proponents of the non-truth-conditional theory like to point out that some iterated conditionals are indeed hard to understand. A famous example is:

- (3) *If Kripke was there if Strawson was, then Anscombe was there.

Edgington (2008) concludes: ‘it is difficult to see why [iterated conditionals] should be so hard if conditionals have truth-values’. However, the mere fact that (3) is more

opaque than (1) does not support this claim. Instead, claims about the relative difficulties of embedded hypothetical thinking can only be based on quantitative data.

The goal of this project is to adjudicate between the two opposing theories about the meaning of conditionals. Following recent work by Elqayam *et al.* (2006) and Huitink (2009), we will take the *inferences* that people are willing to draw on the basis of iterated conditionals as a measure of their intelligibility. The advantage of this method is that people's competence when reasoning with simple conditionals is relatively well studied. For instance, about 90% of the people accept the reasoning pattern known as Modus Ponens for simple conditionals (Evans & Over 2004). The truth-conditional theory predicts a *similar acceptance rate* for Modus Ponens with complex conditionals. Its rival theory predicts that this acceptance rate will be *significantly lower*.

Of course, if find an acceptance rate below 90%, this does not necessarily mean that conditionals lack full truth-conditions. Instead, one could point to the undeniable fact that complex sentences are more complex than simple ones, and attribute the low rates to *increased processing demands* (cf. Elqayam *et al.* 2008). We will thus have to take processing cost into account. Predictions are not all that straightforward and it is part of the project to work these out in detail.

References

- Adams, E. (1998). *A primer of probability logic*. Stanford: CLSI publications.
- Byrne, Ruth M. J. 1989. Suppressing valid inferences with conditionals. *Cognition*, 31, 61-83.
- Edgington, Dorothy. 2008. Conditionals. In Edward N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy (Winter 2008 Edition)*.
<http://plato.stanford.edu/archives/win2008/entries/conditionals/>
- Edgington, Dorothy. 1995. On conditionals. *Mind* 104(414), 235-329.
- Elqayam, S., Handley, S. J., Evans, J. St. B. T., & Bacon, A. M. (2008). On some limits of hypothetical thinking. *Quarterly Journal of Experimental Psychology*, 61, 784-808.
- Elqayam, Shira, David Over, Simon Handley, Jonathan Evans, and Alison Bacon. 2006. Iterated conditionals. Slides of a presentation at the London Reasoning Workshop.
<http://www.bbk.ac.uk/psyc/staff/academic/moaksford/londonreasoningworkshop/elqayamshira>
- Evans, Jonathan & David Over. 2004. *If: supposition, pragmatics and dual-processes*. Oxford: Oxford University Press.
- de Finetti, B. (1937/1964). Foresight: Its logical laws, its subjective sources. Translated in H. E. Kyburg & H. E. Smokier (eds), *Studies in subjective probability* (pp. 55-118). New York: Wiley.
- Gibbard, Allan. 1981. Two recent theories of conditionals. In William L. Harper, Robert Stalnaker & Glenn Pearce (eds.) *Ifs: conditionals, belief, decision, change and time*, 211-247. Dordrecht: D. Reidel Publishing Company.
- Huitink, Janneke. 2008. *Modals, conditionals and compositionality*. Radboud University Nijmegen dissertation.
- Huitink, Janneke. 2009. McGee's counterexample to Modus Ponens. Abstract for Linguistic Evidence 2010. <http://user.uni-frankfurt.de/~huitink/Huitink-LE-Format.pdf>
- Iatridou, Sabine and David Embick. 1994. Conditional inversion. In *Proceedings of NELS 24*.
- Lewis, David K. 1973. *Counterfactuals*. Cambridge, USA: Harvard University Press.
- McGee, Vann. 1985. A counterexample to Modus Ponens. *The Journal of Philosophy* 82(9): 462-471.
- Ramsey, F. P. (1931). Law and causality. In R. B. Braithwaite (Ed.), *Foundations of Mathematics and other Essays* (pp. 156-198): Routledge & Kegan, 1931.
- Stalnaker, Robert. 1968. A theory of conditionals. In N. Rescher (ed.) *Studies in Logical Theory*. Oxford: Blackwell