

What does probability have to do with how people reason?

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Philosophers make a priori arguments about the meaning of "if". Some accounts take the classical material conditional as providing the core meaning. Two dominant psychological theories of reasoning, mental models and mental logic, also argue that this interpretation has a psychological reality, deriving theories of cognitive processes from classical logic. For many years philosophers have also argued that the conditional is interpreted as a conditional event of probability theory. Probabilistic accounts match theoreticians intuitions about the meaning of if: they allow degrees of belief and solve a number of paradoxes inherent in material conditional accounts.

In this talk we introduce coherence-based probability logic as a rationality framework for investigating how people reason about conditionals. We discuss the benefits of this approach for psychological modeling, and report a series of experiments on how people actually interpret and reason about conditionals. For one set of experiments we developed a probabilistic truth-table task to investigate interpretation. The conditional event was the major interpretation, consistent with probabilistic accounts, followed by conjunction.

Intriguingly, we found within-participant shifts from conjunction to conditional event, echoing developmental trends in interpretation. For another set of experiments we investigated the paradoxes of the material conditional, key for distinguishing between different theories of conditionals but until now not investigated empirically. Again the conditional event interpretation was dominant.

We conclude with a discussion of how mathematical theories of reasoning may inform and be informed by psychological research on reasoning.