

What kind of inductive reasoning? How evidence assessment shapes inference

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Humans can draw brilliant inferences from limited information. This happens all the time, and allows classifications, predictions, and diagnoses to be made. Inferences are essential for learning and, more generally, for any effective discovery system, including scientific research. Everyday inferences may be extremely different in content, but less so in structure. Most of them are instances of inductive reasoning because they lead to hypotheses that are supported but not logically implied by the available evidence.

Any inductive reasoning hinges on two key elements: evidence and hypothesis. Research in cognitive science has focused almost exclusively on the latter, and, in particular, on how people judge the probability of a hypothesis in light of the given evidence. Assessment of the impact of new evidence on the credibility of hypotheses has not received equal consideration. As a consequence, numerous basic questions still await an answer: When does an inference sound convincing? How should the weight of evidence be quantified? Are human reasoners good at these tasks? What are the cognitive operations involved in the computation of evidence assessment? What are the relations between evidence assessment and other domains of reasoning?

These questions require both normative and descriptive levels of analysis. In my talk, I will present some studies that my collaborator and I carried out by combining the refinement of Bayesian confirmation measures set out in the epistemology literature with the development of a new experimental paradigm for eliciting assessments of evidential impact. One of our main recent findings is that people's inferences are more accurate and consistent when they concern evidential impact rather than hypothesis credibility. We have also found that it is possible to use evidential impact to reinterpret puzzling phenomena traditionally pertaining to probabilistic reasoning. These results raise the possibility that evidence assessments have greater normative merit than do probability judgments, which are often observed to be deficient.