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Understanding Why: The Cognitive Science of Explanation

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The study of explanation

Explanation has recently emerged as an important topic of study in both cognitive development and cognitive psychology (Keil, 2006; Weisberg et al., 2008). Explanation is intimately related to the growing field of causal reasoning (Sloman, 2005), and has been shown to influence inference, categorization, and learning (Lombrozo, 2006). Although explanation serves as a basis for understanding and learning and is increasingly recognized as an important aspect of cognition, there are few descriptive or normative accounts of explanation in cognitive science. In this symposium we consider the emerging experimental literature on explanation in relation to the philosophy of scientific explanation (Strevens, 2006; Trout, 2007), with the goal of cultivating a cognitive science of explanation.

The symposium will focus on two themes that explore the causes and consequences of explanatory judgments, each addressed by a psychologist-philosopher pair. Weisberg and Strevens will begin by considering the role of informative (or misinformative) details in explanations, as well as the implications for understanding cognitive development and scientific explanation. Lombrozo and Trout will consider the consequences of explanations, and in particular the role of explanatory judgments in guiding (or misguiding) inferences about causation, category membership, and truth. The symposium will conclude with a commentary by Sloman on the promise and perils of a cognitive science of explanation.

Explanation: Do the details matter?

Intuitively, more information makes for better explanations. Yet many of the most illuminating explanations are praised for their simplicity and elegance, for the details they leave out (Strevens, 2004; Lombrozo, 2007). These talks will consider how the quantity and nature of the information contained in explanations affect their quality. Why might less detail make for better explanations? Are some details special (Weisberg et al., 2007)?

Weisberg: Seductive details and other errors of explanatory reasoning

Psychological research has found that people believe explanations to be good even when these explanations contain significant flaws or gaps in reasoning. For example, studies have shown that people fail to recognize circularity in arguments and believe their own explanatory understanding is deeper than it actually is. Weisberg will present an additional error people make when evaluating explanations: They are swayed in their judgments of explanatory satisfaction by interesting but logically irrelevant information, known as “seductive details.” Despite these multiple and serious failures of explanatory reasoning, Weisberg will argue that these problems are not insurmountable. This tentatively optimistic conclusion is supported by evidence from experts’ understanding and use of explanations and from the ways in which adults and children process explanations in a social context.

Deena Skolnick Weisberg will receive her Ph.D. in psychology from Yale in 2008. Her work explores explanation and fictional cognition, and has appeared in *Cognition*, *Science*, and other leading journals.

Strevens: Explanatory depth and causal void

Much work on explanation in the philosophy of science suggests that the key to scientific understanding lies in the appreciation of causal detail, in seeing how the phenomenon to be explained was causally produced. But many striking scientific explanations deliberately exclude causal details, and seem the more profound for it. What can be learned from this datum? How do causal details interfere with understanding? Is there more to explanation than causal understanding? This talk will argue that although causal information provides the bedrock of explanation, both in science and in everyday life, assembling the information only takes you halfway to understanding. Sometimes the most important thing to see is how certain causal details are *irrelevant* to understanding a phenomenon. A psychological mechanism for determining the relevance and irrelevance of causal information will be sketched.

Michael Strevens is an associate professor of philosophy at NYU. His interests include philosophy of science and the philosophical applications of cognitive science. His work has appeared in journals such as *Cognition* and *Philosophy of Science*; his book on explanation is to appear with Harvard University Press in Fall 2008.

Explanation and Inference

Explanations reveal and inform a host of basic cognitive processes, including causal inference and learning (Lombrozo, 2006). Explanations are even used as a basis for assessing truth (Sloman, 1994; Trout, 2002; Lombrozo, 2007). These talks will consider the consequences of the structure and phenomenology of explanations.

Lombrozo: The effects of explanations on categorization and on causal judgments

Recent findings in cognitive development and cognitive psychology suggest that learning and inference are often mediated by causal beliefs. Causal beliefs have been shown to influence processes of attribution and categorization, as well as the rate and nature of causal learning. This talk will suggest that explanations act as a filter to determine *which* causal beliefs are brought to bear on a given judgment. In particular, judgments can differ depending on whether participants entertain a mechanistic explanation that cites proximate causes or a teleological explanation that appeals to functions. Two sets of studies demonstrate that explanations influence judgments of categorization and even judgments about causal relationships. These effects challenge many current accounts of causation and categorization, but can be understood in the context of theories of explanation and causation from philosophy.

Tania Lombrozo is an assistant professor of psychology at UC Berkeley. Her interests include explanation and causal reasoning, and her work has appeared in journals such as *Cognition* and *Psychological Science*.

Trout: The limits of explanatory phenomenology

Many explanations produce a sense of understanding in us even when the explanations are terribly mistaken. This experience or sense of understanding, sometimes genuine and sometimes counterfeit, can range from a dramatic “Aha” experience to a sanguine “stopping rule.” The phenomenology produced by an explanation is independent of the explanation’s goodness. This presentation will consider two questions. First, are there reliable cues to a good explanation? Second, why do people find the phenomenology of an explanation so gripping? Some of the philosophical work on explanatory robustness will be offered to answer the first question, and psychological findings about overconfidence and the structure of learning to answer the second question.

J.D. Trout is a professor of philosophy at Loyola University Chicago. His interests include philosophy of science, epistemology, and psychology, and his work has appeared in journals such as *Philosophy of Science* and *Psychological Review*.

Commentary

Sloman: A cognitive science of explanation

The symposium will conclude with a commentary by Steven Sloman, a professor of cognitive and linguistic sciences at Brown University. Sloman has published widely on explanation and causation (e.g. Sloman, 1994; Sloman, 2005), and his work is often informed by philosophy. As such, Sloman is an ideal commentator for this interdisciplinary symposium on explanation.

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