The Evolution of Mind

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Historically, the psychological investigation of learning and cognition has followed a common pattern. Initially, content-free, domain-general mechanisms are posited to explain a particular phenomenon. Subsequent research then seriously challenges these theories, leading to their modification in order to include species-specific, innate, or other domain specific constraints.

For example, the oft-replicated Garcia effect seriously challenged the notion of equipotentiality of conditionable associations in classical stimulus-response theory in favor of an innate "preparedness" to acquire certain types of associations rather than others (Garcia & Koelling, 1966). Contemporary studies of infant and early childhood cognition have seriously challenged Piagetian (Piaget, 1952 and 1972) and other purely "bottom up" theories of cognitive development in favor of theories that posit innate or early emerging domain-specific constraints on the induction of ontological categories (Carey, 1985; Keil, 1994), causality (Leslie & Keeble, 1987), and the physical properties of objects and object movement (Spelke, 1994). Similarly, decades of research in artificial intelligence seem to be leading to the inexorable conclusion that a reasoner must know something about the domain about which it is to reason if useful inferences are to be made. And in 1982, David Marr exhorted vision researchers to let their research and theories be guided by consideration of the types of problems the visual system must solve in order to allow an organism to negotiate its world successfully.

In recent years, evolutionary psychologists have begun to take this exhortation seriously in their study of cognitive phenomena. The guiding principle of this research is that in order to understand a structure's function, one must consider the problems that the structure evolved to solve. This is not to say that all existing biological structures and their functions were the result of natural selection in the face of evolutionary pressures; sometimes structures or one of a structure's functions can be the by-product of selection for another structure or another of the structure's functions. Nonetheless, allowing this principle to guide one's research is believed to be the most likely way of asking informed questions in our research programs.

Most notable in this regard is research in reasoning and language. In the first two papers, John Tooby and Denise Cummins argue that taking an evolutionary approach in the investigation and explanation of human reasoning can resolve current paradoxes in human reasoning performance. Tooby outlines several evolutionary principles that underlie ecologically rational domain-specific reasoning, reasoning that allows humans to outperform the best artificial systems around today on complex problems such as grammar induction--despite failing on seemingly simple content-free reasoning tasks. Cummins uses evidence from primate field studies, developmental research on early emerging reasoning competence, and neurologically dissociable reasoning competences to posit innate reasoning architecture that is specific to a type of social reasoning called deontic reasoning. Her argument takes seriously the claim made by Cheney and Seyfarth (1985, p. 39) that "...among primates, evolution has acted with particular force in the social domain."

In the symposium's final paper, Colin Allen cites evidence from comparative studies of animal communication to propose an argument concerning the central role of referential signalling in the evolution of language. Allen's argument reaches deep into language's evolutionary roots to shed light on how basic referential signals are used by other species to categorize events in the world. While Universal Grammar appears to be a communicative system that is specific to humans as a species, referential signalling is a fundamental component of natural communicative systems used by other species as well.

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