Integrating two evolutionary models for the study of social cognition
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In the hopes of understanding more about the origins of human social cognitive abilities such as teaching and deception, much attention has been centered on the question of whether chimpanzees, our closest extant relatives, understand others as psychological agents (Tomasello and Call 1997; Tomasello 1999). Currently results from work with chimpanzees can potentially be viewed as contradictory (see Heyes 1998; Hare in press, for reviews). One approach, which represents the majority of studies, has produced little compelling evidence that chimpanzees attribute psychological states of any kind (i.e. perceptions, attention, intentions, or beliefs) to others (see Heyes 1998; Tomasello and Call 1997, for reviews). Another, by contrast, finds evidence that chimpanzees can at least take another individual's visual perspective (Hare et al. 2000; Hare et al. in press; Hirata and Matsuzawa in press).

There are two possible resolutions to these findings. The first is empirical: further experimental work may show that one or both approaches is flawed. The second is conceptual: theoretical differences which lead to different experimental paradigms may account for the different findings. Given that we do not know the outcome of future studies, we focus here on the second potential resolution. We ask whether seemingly contradictory experimental outcomes can be attributed to the types of problems that the two different approaches suggest should be posed to test species.

Attempts to understand the evolution of cognitive abilities are typically framed by one of two kinds of hypothesis, here called the "general purpose intelligence hypothesis" and the "adapted cognition hypothesis". We argue that in order to improve our ability to design and interpret experiments on social cognition, it is most constructive to consider the predictions and approaches of both these hypotheses. We illustrate our argument with investigations into chimpanzee and dog social cognition. The results of these studies are puzzling and potentially contradictory in relation to the general purpose intelligence hypothesis alone, but they make sense in light of the adapted cognition hypothesis.

The general purpose intelligence hypothesis

Models of general-purpose intelligence attempt to explain the evolution of all-purpose cognitive mechanisms such as memory, categorization, learning, or reasoning that can vary between genetically canalized systems, such as those often observed in invertebrates (Gould and Gould 1986), and highly flexible, content-independent cognitive processes believed to underlie human intelligence. The variation in the flexibility of these general purpose problem-solving abilities is commonly considered to be explained by increases in computing power during evolution, rather than the result of an adaptation to any particular kind of problem (Gibson 1990). Therefore, an increase in general-purpose intelligence might evolve, for example, as a physiological constraint is released allowing for an increase in brain size and thus computing power (Aiello and Wheeler 1995).

Thus, the general-purpose intelligence hypothesis predicts: 1) taxon-level (or brain-size) differences in intelligence unrelated to obvious features of ecology or social behavior; and 2) abilities which can be applied across contexts and have not been selected to solve any specific evolutionary problem(s). Thus, paradigms that can be used across taxa and that are evolutionarily irrelevant offer the most experimental power.

Examples consistent with these predictions include evidence for mirror recognition in several hominoid species, but not in other primates (Gallup 1982), and proposed taxon-level differences in reversal-learning tasks (Rumbaugh and Pate 1984a,b). In both cases, large brained hominoid species, which evolved in radically different ecologies, out-perform other primates in what are arguably evolutionarily irrelevant tasks.