

THE REFLECTIVE MIND: AN ALTERNATIVE APPROACH TO ANIMAL COGNITION

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There is a curious double standard embedded in the paper on animal cognition by Prato Previde, Colombetti, Poli and Spada (this issue). They claim that "the main reason for attributing cognition to animals is that we, as humans, do experience a mental life" and furthermore "the prototype of cognition is, by definition, human thought." (p. 82) I agree that it is appropriate to inquire as to whether there might be cognitive states in animals that correspond to or at least resemble those of humans. Indeed, focusing on carefully targeted features of human experience could lead to some testable hypotheses about different features of the mental lives of animals, and as a consequence animal cognition might eventually become a matter of evidence rather than a matter of faith (Gallup, 1992). But a few pages latter, in the absence of any evidence, Prato Previde et al. erect some unnecessary barriers to this process by asserting that "reflecting on one's own beliefs and concepts" may be uniquely human and that the subjective quality of experience is "impossible to assess." (p. 87)

In their overview of animal cognition Prato Previde et al. focus on two paradigms, the "semantic" mind and the "computing" mind. There is, however, another approach, which I will call the "reflective" mind that focuses on the extent to which animals can conceive of themselves and represent mental states in themselves and others. If representation is the "central concept of cognitive theories" as Prato Previde et al. claim (p. 85), then it would seem reasonable to ask whether there are species capable of representing mental states in themselves and others. Prato Previde et al., however, dismiss this approach as an "anthropocentric mistake" and one that emphasizes abilities that may be exclusively human. (p. 87)

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But regardless of whether anthropomorphism is a mistake, it is a pervasive feature of human existence. People from all walks of life anthropomorphize. Indeed, as any radical behaviorist could testify it requires a lot of deliberate effort and training not to engage in anthropomorphism when describing the behavior of animals (Premack & Woodruff, 1978). So why do people anthropomorphize in the first place? From my perspective anthropomorphism is an inevitable byproduct of the "reflective" mind and represents an intriguing instance of mental state attribution in its own right (Gallup, 1985; Eddy, Gallup, & Povinelli, in press). Not only do people routinely make attributions and inferences about mental states in one another, in the case of anthropomorphism we simply generalize these mentalistic accounts of behavior to species other than our own.

Over a decade ago I theorized that the ability to recognize oneself in a mirror was based on an underlying capacity to conceive of oneself, and I reasoned that species that could correctly decipher mirrored information about themselves ought to be able to use their experiences and knowledge of their own mental states as a means of inferring comparable states of mind in other organisms (Gallup, 1982). This model implies that there may be animals which not only make attributions about mental states among one another, but just as we anthropomorphize by routinely generalizing such attributions to other species, they may do the same (Eddy, Gallup, & Povinelli, in press; Povinelli, in press, b). We should not be too quick to dismiss the presence of certain complex mental states in animals on the grounds that they may be uniquely human. Whether other organisms can conceive of themselves and use their experience as a means of modelling the experience of others is an empirical question and a variety of techniques are now available which can be used to assess mental state attribution in animals (Cheney & Seyfarth, 1990; Povinelli, Nelson, & Boysen, 1990; Premack & Woodruff, 1978).

Another important distinction among these approaches is that the "semantic" mind and the "computing" mind are largely descriptive/metaphorical accounts of animal cognition. The "reflective" mind differs from these not only in the cognitive processes that are targeted for analysis, e.g., self-conception, cognitive empathy, visual perspective taking, but unlike the others it provides a framework from which one can generate testable hypotheses about animal cognition (Gallup & Povinelli, in press). As Povinelli (in press, a) has recently pointed out, progress in the field of animal cognition is increasingly dependent upon replacing the "description-to-argument cycle" by a "prediction-to-data collection cycle."

In support of predictions derived from the "reflective" mind, there is growing evidence that points to some striking species differences between chimpanzees, that can recognize themselves in mirrors, and rhesus monkeys and other macaques, that fail tests of self-recognition in their ca-

capacity for mental state attribution (Cheney & Seyfarth, 1990; Povinelli, Nelson, & Boysen, 1992). For example, whereas chimpanzees can distinguish among different people as informants as a function of whether they have witnessed certain events (Povinelli, Nelson, & Boysen, 1990), monkeys seem incapable of taking into account knowledge states in humans (Povinelli, Parks, & Novak, 1991) and in other monkeys (Cheney & Seyfarth, 1990). It is also interesting to note the presence of some intriguing parallel changes in social cognition among human infants who begin to appear at or after the time they come to recognize themselves in mirrors (Brownell & Carriger, 1990; Lewis et al., 1989). As further evidence for its breadth and utility, the "reflective" mind has been used to provide an account of the evolution of human ethical systems (Povinelli & Godfrey, in press) and even the emergence of theistic thought (Maser & Gallup, 1990).

REFERENCES

- Brownell, C. A., & Carriger, M. S. (1990). Changes in cooperation and self-other differentiation during the second year. *Child Development, 61*, 1164-1174.
- Cheney, D. L., & Seyfarth, R. M. (1990). Attending to behaviour versus attending to knowledge: Examining monkeys' attribution of mental states. *Animal Behaviour, 40*, 742-753.
- Eddy, T. J., Gallup, G. G., Jr., & Povinelli, D. J. (in press). Attribution of cognitive states to animals: Anthropomorphism in comparative perspective. *Journal of Social Issues*.
- Gallup, G. G., Jr. (1982). Self-awareness and the emergence of mind in primates. *American Journal of Primatology, 2*, 237-248.
- Gallup, G. G., Jr. (1985). Do minds exist in species other than our own? *Neuroscience and Biobehavioral Reviews, 9*, 631-641.
- Gallup, G. G., Jr. (1992). Mental states must become matters of fact, not faith. *Animal Behaviour, 43*, 354-355.
- Gallup, G. G., Jr., & Povinelli, D. J. (in press). Mirror, mirror, on the wall, which is the most heuristic theory of them all? *New Ideas in Psychology*.
- Lewis, M., Sullivan, M. W., Stanger, C., & Weiss, M. (1989). Self-development and self-conscious emotions. *Child Development, 60*, 146-156.
- Maser, J. D., & Gallup, G. G., Jr. (1990). Theism as a byproduct of natural selection. *Journal of Religion, 70*, 515-532.
- Povinelli, D. J. (in press, a). A theory of mind is in the head, not the heart. *Behavioral and Brain Sciences*.
- Povinelli, D. J. (in press, b) Panmorphism. In R. Mitchell & N. Thompson (Eds.), *Anthropomorphism, anecdotes and animals*. Lincoln: University of Nebraska Press.
- Povinelli, D. J., & Godfrey, L. R. (in press). The chimpanzee's mind: How noble in reason? How absent of ethics? In M. Nitecki (Ed.), *Evolutionary ethics*. Albany: State University of New York Press.
- Povinelli, D. J., Nelson, K. E., & Boysen, S. T. (1990). Inferences about guessing and knowing by chimpanzees (*Pan troglodytes*). *Journal of Comparative Psychology, 104*, 203-210.
- Povinelli, D. J., Nelson, K. E., & Boysen, S. T. (1992). Comprehension of role reversal in chimpanzees: Evidence of empathy? *Animal Behaviour, 43*, 633-640.
- Povinelli, D. J., Parks, K. A., & Novak, M. A. (1991). Do rhesus monkeys (*Macaca mulatta*) attribute knowledge and ignorance to others? *Journal of Comparative Psychology, 105*, 318-325.
- Premack, D., & Woodruff, G. (1978). Does the chimpanzee have a theory of mind? *Behavioral and Brain Sciences, 1*, 515-526.