Afterword to *The Cognitive Animal*: What is it like?

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The preceding chapters in this book demonstrate how rapidly our knowledge and understanding of animal cognition is expanding. One might even say exploding. In the 1970s it seemed radical to suggest that there was such a thing as nonhuman cognition (Griffin 1976). But even during the few months since I finished an expanded review of animal mentality (Griffin 2001) at least a dozen importantly relevant publications have appeared.

One significant aspect of animal cognition has received relatively little attention, however. This is the question of subjective consciousness, what life is like for the animal itself. Most chapter authors implicitly or explicitly restrict their attention to information processing in animal nervous systems, although this information processing includes such activities as remembering and decision making that are ordinarily considered to involve conscious thinking. Thus an innocent reader might well conclude that none of the animals whose cognition is analyzed want, believe, hate, fear or intend. Most of the authors would probably deny any intention to be dogmatically negative and take an agnostic position justified by a conviction that any such experiences are private and inaccessible to scientific investigation.

One reason for this strong aversion to consideration of conscious experience seems to be the assumption that consciousness is complex, sophisticated, and perhaps even ethereal. This view may, however, be misleading and needlessly restrictive. In our species conscious experience obviously varies enormously in many dimensions from extremely simple to profoundly complex and subtle. Certainly it is one aspect of cognition that is important in our species, and insofar as it occurs in others it may well be important to the animals themselves. One approach that has been

effective with other difficult problems in biology is to select simple examples and examine all available evidence bearing on their occurrence and nature. Familiar examples are the use of *Drosophila* in genetics and *Aplysia* ganglia in search of biochemical correlates of learning.

If an animal experiences a simple and basic emotion such as pain or fear, this may well be subjectively real and important to the animal in question yet very simple, as pointed out by Marian Dawkins (1993). Rather than assuming that all consciousness must be similar to and as complex as ours, a sort of bottom-up approach to the challenge of identifying and analyzing nonhuman consciousness may make much more rapid progress by the tried and true method of starting with the simplest examples.

There is a significant difference between behavior that is or is not accompanied or influenced by conscious subjective experiences. We cannot fully understand particular animals fully until we know into which category they belong under various conditions. Insofar as they are conscious we need to learn whatever we can about the *content* of their subjective experiences, what they feel or what they think about. It is therefore appropriate to inquire to what extent the animals whose cognition is discussed in this book are aware of their situation and whether they consciously choose what to do.

The behavioristic admonition that scientists cannot learn anything at all about nonhuman consciousness is rapidly becoming obsolete. For example, the search for neural correlates of consciousness has become one of the most active areas of neuroscience, as reviewed by Baars 1997; Crick and Koch 1998; Edelman 2000; Taylor 1999; and Tononi and Edelman 1998. But determining the content of an animal's conscious awareness remains formidably difficult.

As Crist reminds us, Charles Darwin had no doubt that many animals are conscious of simple matters important in their lives. He became convinced by careful observation and

experiments that earthworms probably experience very simple thoughts about the procedures by which they plug their burrows. The neural correlates of consciousness do not seem to entail specific features of gross neuroanatomy. Whatever basic processes lead to conscious awareness my therefore be present in a wide variety of animals.

Consciousness is obviously a highly heterogeneous phenomenon. We know it varies widely in our species and there is every reason to expect even greater variability according to the physiological capabilities of various animals and the matters that are important in their lives.

The content of animals consciousness is probably limited to matters of direct concern to them, and of course it does not include the more complex levels of human thought. But simplicity of content does not mean total lack of subjective consciousness.

How can objective, verifiable, scientific data about animal consciousness be obtained? Similarity of neural structure and function is one type of evidence; and none of the proposed neural correlates of consciousness entail any element or process that is qualitatively unique to our species. Adaptive versatility in adjusting behavior to cope with novel challenges, for which neither evolution or learning provide specific instructions, constitutes suggestive evidence of simple conscious thinking about alternative behaviors available to an animal and their likely results. But scientists reluctant to infer subjective consciousness in animals often claim that whatever an animal, or a human, does *might* be accomplished unconsciously.

With our human companions we avoid, or at least minimize, this uncertainty by relying on communication as evidence about their subjective thoughts and feelings. Such evidence stems from both verbal language and nonverbal "body language." The versatility of animal communication suggests that the messages they exchange with others may also provide objective evidence about at least part of the content of their consciousness. Communicating

animals may be almost literally telling us what they are feeling or thinking. Here too, determined skeptics tend to imply that only human communication provides evidence of subjective thoughts and feelings. But evolutionary biologists are rightly suspicious of claims that some trait suddenly appears *de novo*, without any precursors. The difference between human consciousness and that of any animal is no doubt enormous; but this difference is probably one of degree rather than kind.

Total certainty is not attainable even when we inquire about the thoughts and feelings of our human companions. Therefore cautious scientists have a strong tendency to avoid this question, and some insist that such questions are inappropriate for scientific inquiry (but see Bekoff 2000a,b). But the question of whether some nonhuman animals have any conscious experiences is an important one, and science does not advance by ignoring significant challenges. Despite recent advances and continuing progress we must deal with hypotheses that cannot yet be confirmed or rejected with total precision and certainty. But the tentative assumption that some animals experience simple levels of subjective awareness often enables us to make sense of their behavior. Like the once radical notion that the Earth revolves around the Sun, this approach "simplifies calculations."

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