

Are Apes Conscious?

Are Apes Conscious? An Overview of Inconclusive Evidence¹

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February 24, 1989, 13:09 h. Noises are heard coming from the vegetation. A young male swings from a branch and leaps into a tree.... He emits sharp calls, which are answered by other individuals who are not visible. He points—with his right arm stretched out and his hand half closed except for his index and ring fingers—to the position of the two groups of camouflaged observers who are in the undergrowth. At the same time he screams and turns his head to where the other members of the group are.... 13:12 h. The same individual repeats the pointing and calling sequence twice. Other neighbouring members of the group approach. They look towards the observers. The young male joins them.

Excerpt from the records of a team studying wild bonobos in the Congo, reproduced in DeWaal (2001).

The literature is lush with accounts of apparent intentionality in ape behavior: A gorilla conceals a desired but forbidden object from her trainer (Patterson & Cohn, 1994), a chimpanzee makes use of empty kerosene cans to augment his dominance display (Goodall, 1984), a bonobo parades in front of his mother wearing a Halloween mask (Savage-Rumbaugh, Shanker & Taylor, 1998). Example after example has been put forward to support the view that our primate cousins are not merely mechanistic machines but thinking, feeling creatures with rich mental lives perhaps not so different from our own.

Many researchers are convinced that apes have conscious mental experience and that they are aware others have minds of their own. Many other researchers are not so convinced. Skeptics argue that behavior is an unreliable indicator of inner states, or that human language, which apes lack, is a necessary condition for consciousness. But why is there even debate on the subject? Why do many people devote a large part of their lives searching for an answer to the question 'Are apes conscious?' One reason seems to be that humans are curious beings who seek knowledge for its own sake. Many of us find it intrinsically interesting to ponder what is going on in the heads of others, whether human or non-human. A second reason is more politically motivated. Discovering that apes can suffer would have important ethical implications for scientific research involving non-human primates. In fact, those who are skeptical of ape consciousness sometimes accuse supporters of over-interpreting ape behavior in a hidden agenda to advance animal rights. Supporters, on the other hand, often accuse detractors of being closed-minded in a desire to preserve humankind's special status on earth.

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There is also a practical reason for studying the mental life of apes. As our closest genetic relatives, apes are neurophysiologically more similar to humans than other species, albeit somewhat less complex. If any animals were to have mental experiences similar to our own it would most likely be them. Understanding how the minds of apes work may therefore be a way to gain insight into the human mind, the ultimate goal of cognitive science.

Consciousness still unexplained

The study of ape consciousness is not without its problems, perhaps the greatest being that we still do not have a satisfactory understanding of what consciousness is. Griffin (1992) reviews the “many kinds and degrees of consciousness” referred to throughout the literature. I will not attempt to summarize all of them here except to say that a common distinction is made between perceptual consciousness and reflexive consciousness. Whereas the former involves knowing things about oneself and the world, mainly through one’s senses, the latter includes the extra capacity to know that one knows. Creatures with reflexive consciousness can think about their own thoughts, can think about the fact that they are thinking about their own thoughts, and so on ad infinitum (in theory, at least). Griffin notes that most people are willing to concede perceptual consciousness to animals but reserve reflexive consciousness for humans. But not everyone agrees completely on the use of the terms perceptual and reflexive consciousness, and so definitions with different shades of meaning abound. Complicating the issue further is that some believe consciousness to be an all-or-nothing phenomenon while others consider the changeover from unconscious to conscious beings to be a more gradual process.

Perhaps frustrated by all this semantic confusion, many researchers opt to avoid the term consciousness altogether and talk instead about mental properties that are related to the vague notion of consciousness but are more specific, such as “theory of mind” or self-awareness. Others adopt the more inclusive term “mind”. Another tactic is to make clear from the outset what one means by consciousness and proceed from there, although others may disagree with one’s assessment. A final approach is to forge ahead discussing consciousness without specifying a precise definition for it.

The last approach is the one I will take, but not to save myself the difficult task of defining the term (although given that philosophers have been trying to do this for hundreds of years one could not be blamed for avoiding it). Rather, it is because I wish to discuss a wide variety of research without being limited by the precise definition of consciousness any given writer may employ. It also gives me the freedom to discuss writers of the first persuasion above who, instead of studying “consciousness” per se, study other mental properties that are closely related to it (perhaps are elements of it) but are more precisely defined. Finally, not specifying up-front a definition for consciousness leaves the meaning open to change. Allen and Bekoff (1997) point out that “satisfactory definition is an endpoint of scientific investigation, not a starting point” (p.145). We may eventually discover through investigation that there can be no satisfactory definition for consciousness, that, as Dennett (1991) argues, the term has many uses and simply cannot be resolved into one coherent concept. It may be too early to try and pin down a precise definition for consciousness, in other words, and the best strategy for now may be to leave the concept fuzzy until we learn a little more about it.

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In addition to not defining consciousness, I will use the terms consciousness and awareness interchangeably throughout this paper in order to preserve as closely as possible the terms used in the writings discussed. There is no consistent distinction made between the terms throughout the literature, and attempting to draw a distinction here would again require me to be more precise than I want to be. I will simply assume that when writers refer to consciousness and awareness they are referring to roughly the same phenomenon. In some cases it will be possible to be more specific about the type of awareness being considered (e.g., awareness of oneself as a being separate from other beings and the physical world; awareness of one's body in space; sensory awareness of one's environment; awareness of the objects in one's environment; awareness of one's ability to have an effect on one's surroundings; and awareness that others have thoughts, feelings, beliefs and desires that differ from one's own). In other cases it will be clear that we are talking about the highest form of awareness we know of, the kind normally attributed to humans. This includes not just awareness of oneself, the world, and others, but also the ability to reflect on this awareness, equivalent to the "reflexive consciousness" discussed earlier.

Degrees or dichotomy?

In *The Descent of Man* (1871) Darwin argues for mental continuity in the mental experiences of animals and humans, and many modern-day scientists and philosophers share his view. The field of evolutionary psychology, for instance, was founded on the assumption that we can learn much about human minds and behavior by peering into our evolutionary past at our animal ancestors. On the other hand, there are some still holding to the discontinuity thesis put forward by Descartes in *The Discourse on Method* (1637). They argue for a radical break between humans and animals in intelligence, in that humans have minds and animals do not. More common today is a moderate form of discontinuity in which animals also have minds but those minds are very different from human minds. Dennett (1996) espouses a popular view that language is behind this difference: "In our survey of minds (and protominds) there does not seem to be any clear threshold or critical mass—until we arrive at the sort of consciousness that we language-using human beings enjoy. That variety of mind is unique, and orders of magnitude more powerful than any other variety of mind" (p.162).

Weiskrantz (1997) tells us that some believe consciousness to be an emergent property of the increasing complexity of the brain, a view that can be seen to incorporate elements of both continuity and discontinuity. Specifically, as complexity (perhaps number of neuronal connections) continues to increase, at some point a threshold is reached and consciousness emerges. A quantitative change leads eventually to a qualitative change, just as increasing frequency of iterations causes more intricate patterns to become apparent in Conway's Game of Life. If the emergence view is correct, then it is possible to have continuity in the complexity of animal and human brains and to still have discontinuity in awareness, provided that only human brains have reached the required critical threshold.

Studying consciousness without words

Previously, I mentioned that the scientific study of ape consciousness faces some problems, not the least being the absence of a satisfactory understanding of consciousness. A second major problem is that apes cannot talk. As Dennett (1996) points out, we know other

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people have minds because they tell us, and words are a great way to resolve ambiguity.

But apes do not have language and so cannot simply tell us what they are thinking or feeling. Attempts to get around this problem have made for creative research in the disciplines that have taken an interest in the topic, largely Psychology, Philosophy, Ethology, and Neuroscience. Efforts have included searching for indicators of consciousness in ape behavior, designing experiments to indirectly test for consciousness, comparing the neurophysiology of apes and humans, and even training apes to communicate with us in alternative ways. The results of these efforts have provided fuel for the vigorous debate, ongoing in the philosophical literature, over whether animals might have mental experiences anything like our own.

Can behavior be trusted?

A question of interest in the philosophical literature on consciousness is whether or not we can know from outward behavior whether one is conscious. Consider ‘Cog’, says Dennett. Cog is a robot at MIT whose ultimate fate, if his developers achieve their goal, is to be conscious. For the time being, though, Cog is just a machine with realistic body movements and facial expressions. But as his eyes track others’ actions he gives the impression of being much more than that. His behavior is suggestive of a thinking, conscious being, demonstrating that we are too easily fooled by outward behavior to rely on it as an indicator of consciousness, says Dennett. Weiskrantz (1997) agrees that behavioral evidence is problematic, noting that responding to a stimulus is not necessarily accompanied by awareness of the stimulus. Paraplegics, for example, can display a physical response to a stimulus presented to the paralyzed limbs, even as they report being unable to feel it.

Because of these limitations on what can be inferred from behavior, researchers have searched for alternative indicators of consciousness. Weiskrantz considers complexity of the nervous system as one possibility, but then rejects it on the basis of localized lesions that impair consciousness without changing the complexity of the brain, per se. ‘If a reduction in complexity will not account for the loss of awareness, why should adding complexity generate it?’ he asks (p.82). The logic of this argument seems questionable, as it is akin to concluding that because lesioning the heart stops body function but does not destroy the overall complexity of the body, complexity cannot be necessary for the body to function. The problem with Weiskrantz’s argument aside, it is clear that complexity of a system is not a reliable indicator of consciousness. Evolution over eons can result in amazingly complex yet unconscious systems.

Others have suggested looking to an organism’s environment and lifestyle to determine if consciousness is required of it. Many (among them Allen & Bekoff, 1997; Franklin, 1995) have described the survival advantage that having consciousness would confer on an individual, especially when the environment is complex or variable and requires flexibility of behavior. Of course, this assumes that there is only one way to solve the problems a complex environment presents. Consciousness is one way—the way that humans happened to develop—but there may be other ways just as effective, or even more so.

To summarize the situation to this point, apes cannot speak so we must find an alternative way to determine if they are conscious. Studying their outward behavior for clues is problematic because outward behavior may not be a true reflection of inner states. So what are we to do?

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Some philosophers would suggest we give up, that whether or not a creature experiences consciousness is necessarily unknowable. For practical purposes, however, many investigators (e.g., LeDoux, 1996; Panskepp, 1998) have decided not to concern themselves with philosophical certainty. Almost all scientific investigation involves uncertainty, they argue, but that is no reason to throw up our hands in defeat. We can still look for evidence of awareness in apes, even if finding undeniable proof is impossible. In fact, we do not have ‘proof’ even for human consciousness, and why should we impose stricter criteria for attributing consciousness in apes than we do for humans? Panskepp argues “we can only proceed experimentally if we accept objective animal and human behaviors as accurate indices of inner states. It is unlikely that human verbal reports will provide the *only* inroad to the analysis of conscious experience.... Indeed, words give us a special ability to deceive each other. There are many reasons to believe that animal behavior will lie to us less than human words” (p.302).

So philosophical certainty is put aside, and researchers go about identifying behaviors or abilities that may provide evidence of consciousness in apes and other animals. Griffin (1992) suggests the following: demonstrated versatility of behavior, adaptability to changing circumstances, inventive behavior, and communicative behavior in which animals seem to convey thoughts to others. Weiskrantz (1997) suggests reasoning and problem solving abilities, ability to learn, and fun seeking or play behavior. Franklin (1995) mentions tool use as a possible indicator of consciousness. As mentioned before, there is much anecdotal evidence that apes display these behaviors and abilities, both in the wild and in captivity. But these anecdotes are often explained away by skeptics as over-interpretation on the part of observers. In response, some researchers have attempted to test for consciousness in a more controlled manner.

Allen and Bekoff (1997) put forward a novel suggestion for tapping into animal consciousness. They argue that a good indicator is the demonstrated ability to detect misinformation. Humans viewing an optical illusion can recognize the distinction between what their senses are telling them and what they know to be the case. Knowing that the lines in the Muller-Lyer illusion are the same length does not stop one from perceiving them as different lengths. If one must act according to the *true* length of the lines, the perception of inequality can be overridden, although it cannot be changed. The ability to separate perceptions from judgments in this way indicates that humans have beliefs about the world that are separate from their perceptions, and that, according to Allen and Bekoff, is evidence for conscious thought.

If the same kind of separation of perception and belief can be demonstrated in animals, then that is evidence that they possess some level of conscious thought as well. The researchers provide an example: ‘If a bat can detect when it is being misinformed about an obstacle and can adjust its behavior appropriately, and if it is possible to obtain evidence that the bat still perceives the obstacle in the distorted way’ this is evidence that there is a qualitative component to its perceptions of the obstacle (p.155). Allen and Bekoff do not provide any suggestions on how to obtaining evidence that the bat still perceives the obstacle in the distorted way. Nevertheless, the idea is intriguing, and designing experiments to test it would be an interesting challenge.

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Search for a theory of mind

Despite philosophers' claims that we can never know for sure if there are other minds, let alone knowing what the contents of them might be, most humans do not collapse helplessly into solipsism. As LeDoux (1996, p.300) reminds us: "It is useful to live our lives in violation of philosophical certainty and treat others as if they are conscious."

Up to this point I have been discussing research into the question of whether or not animals, and in particular apes, are conscious. In looking for answers to this question, many ethologists, psychologists and philosophers have focused on identifying outward behaviors which might indicate an animal is perceptually aware of its environment and can respond to it in flexible and intelligent ways. But some try to answer the question 'Are animals conscious?' by posing another question for examination: 'Do animals treat others as if they had minds?' If it can be demonstrated that animals live their lives as if others around them had beliefs, desires, and knowledge separate from their own, then we might conclude that these animals had at least some degree or type of mental awareness: the awareness of other minds. Once again, for lack of any satisfactory alternative, researchers look to outward behaviors for evidence that animals attribute mental states to others.

Deception. Researchers often cite deception in animals as a strong behavioral indicator of a theory of mind. Of course they mean intentional deception, not reflex deception such as when a chameleon changes colour to blend in with its background. "The difference between □reflex□ pretence and 'thoughtful' pretence," Weiskrantz tells us 'is a distinction between modes of thinking and its absence, and it might be considered that thought necessarily entails consciousness (p.79)." Examples of apparent intentional deception cited by Griffin (1992) include the mimicking of other species' flashing patterns in fireflies, the use of false alarm calls in some types of monkeys, and the protection of young from predators in some bird species using distraction displays.

In apes, the behavioral evidence for intentional deception is strong. Griffin (1992) describes how subordinate male chimpanzees will try to mate with females only when dominant males are not looking, and will even hide their erect penis when a dominant male walks by. DeWaal (2001) tells us of an ape who learns to point in the wrong direction to deceive an unfriendly experimenter who repeatedly takes food for himself. And Patterson and Cohn (1994) claim that Koko, a gorilla trained in sign language, even uses verbal tactics to deceive her companions and caretakers.

Nevertheless, it is often difficult to tell just from observing behavior whether it is intentional or reflexive. Krebs and Dawkins (1984) explain how complex manipulative behavior can evolve without any there being any conscious intention to deceive. Natural selection favors animals whose behavior takes advantage of the lawfulness of others' behavior, even if the manipulator is completely unaware of the manipulation.

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Teaching and imitation. When teaching others a skill, one must operate on the assumption that the others do not already share one's knowledge and that this knowledge can be imparted to them by some kind of verbal or physical demonstration. In other words, it requires the understanding that others have minds with different contents from one's own, and that contents can be shifted from one mind to another. If we observe animals apparently teaching other animals, this is strong evidence they have a theory of mind.

Apes are among the most socially and mentally advanced creatures on the planet, yet few instances of what might count as teaching have been observed among them. Budiansky (1998) does offer one example of chimpanzees on the Ivory Coast who appeared to help their young learn to open nuts with a stone. In one case the mother rotated the incorrectly placed nut to the correct position before letting her son crack it with a stone. In another case the mother rotated the hammering stone to a better position in her daughter's hand. Budiansky also gives examples of cheetahs that teach their young learn to kill prey and ospreys that teach their young to catch fish. He points out that what is most striking in these observations is the flexibility of the parents' behavior, which seems to be continuously adjusted according to the responses of the offspring. But he also presents an alternative to the explanation that the parents are aware of their offspring's mental states. It is possible, he argues, that they are simply reacting to the overt behavior of their offspring, and this may be just one manifestation of a general innate cognitive ability to react to all their offspring's changing needs.

Budiansky suggests that imitation behavior might offer a more direct indication that animals know about other minds. But, again, few instances of clearly imitative behavior have been found in animals, even in primates, who are popularly believed to have strong imitative natures (Hauser, 1999). Jane Goodall, who spent her entire career studying chimpanzees in the wild, draws the same conclusion based on her observations: teaching and imitation do not appear to be present in wild chimpanzee behavior. Interestingly, some primates reared in captivity do appear to imitate the actions of humans. Some chimpanzees, for example, have been taught to produce the hand movements for American Sign Language, and they tend to repeat signs that a trainer has just finished making (Gardner, Gardner, & Cantfort, 1989).

Pointing. "There is no point to pointing unless you understand that the other hasn't seen what you have seen, which involves realizing that not everyone has the same information" (DeWaal, 2001, p.1). DeWaal claims that the literature is replete with examples of pointing in primates. He adds, however, that many researchers impose too strict a criterion for classifying behavior as pointing and so they miss many of the examples. We cannot expect to see apes pointing as humans do, with an index finger, he argues. Monkeys in the wild often point with their whole bodies or with their heads and eyes. Among many species of primates a behavior called "head flagging" is common, especially when the animal is being threatened by another and is trying to enlist help from his peers. The threatened animal will sit next to his usual protector, jerk his head towards his antagonist while vocalizing, and look repeatedly back and forth between the two. DeWaal claims that the back and forth looking is done to ensure the partner is paying attention and is seeing what the pointer wants him to see. Humans do this all the time, and

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DeWaal believes it is a strong indicator of intentional behavior in apes.

Some apes have been seen to point with an outstretched arm, as the example of the pointing bonobo cited at the beginning of this paper demonstrates. Such manual pointing is more common among apes raised in captivity and DeWaal offers many examples, including chimpanzees that will point with their whole hand (sometimes even with an extended index finger) at a banana outside of their cage beyond their reach. This is usually accompanied by gaze alternation between the human and the banana, as in the head-flagging example described above. Savage-Rumbaugh et al. (1998, p.14) present a photo in which a bonobo being carried through the forest in Savage-Rumbaugh's arms points with his arm in the direction he wants her to take. The photo is ambiguous, however, as the same action would occur if the animal simply stretched to obtain an object beyond its immediate reach.

DeWaal concedes that apparent pointing may develop in captive animals because they learn quickly that it elicits a response from humans. This possibility makes it difficult to know absolutely if the animals understand the reasoning behind the pointing (i.e., to make the observer aware of something they are not presently aware of). One piece of evidence which suggests that apes are not pointing simply to elicit a response from humans is that those trained in sign language have sometimes been observed pointing to pictures in magazines while signing to themselves, even when there are no humans present (e.g., Patterson & Cohn, 1994).

One more example cited by DeWaal deserves mention. Panzee, a chimpanzee at Georgia State University's Language Research Center, would point and vocalize to get her caretakers to retrieve an item that had been hidden by a researcher the night before in the caretakers' absence. Trained to communicate using a lexical keyboard, Panzee would sometimes point to the appropriate symbol on the keyboard to identify the hidden item. "The result," concludes DeWaal, "was intentional communication about a past event, present in the ape's memory, to people who knew nothing about it and thus were unable to give her any clues" (DeWaal, 2001, p.4).

Self-awareness

To be aware of one's own mental processing is considered by many to be the defining feature of consciousness. But there may be other ways of being aware of oneself that do not involve the ability to reflect on one's thoughts. Franklin (1995) believes there is no sharp distinction between animals that are self-aware and those that are not, and he lists a number of other "competencies" or behaviors that may indicate varying levels of self-awareness. These include concealing the body or avoiding leaving tracks when appropriate (for example when stalking prey or when being stalked), attempting to modify or improve oneself, recognizing oneself in a mirror, using personal pronouns, talking to oneself, talking about one's mental states, attributing mental states to others, and practicing deception. The last two behaviors have been discussed above; some of the others will be discussed below.

One of the methods devised by ethologists to study self-awareness in primates is called the "mirror mark test". The test involves marking some region of the animal's face or head while it sleeps with a non-toxic, washable paint or dye and then later observing its reactions as it views its reflection in a mirror. Paying an inordinate amount of attention to the marked area or trying to remove the paint are seen as indicators that the animal recognizes itself. Patterson and Cohn

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(1994) performed the mirror mark test on their lowland gorilla subject Koko. She displayed significantly more self-directed behaviors and spent significantly more time looking in the mirror when she was marked than when she was not marked.

Even without the marking, some apes may indicate that they recognize themselves in a mirror. Budiansky (1998) describes studies indicating that chimpanzees will initially react to a mirror with vocalizations and threatening gestures, as if they believed the reflection was another chimpanzee. After some time, however, they appear to recognize the image as themselves and will then use the mirror to groom or inspect visually inaccessible parts of their body. Budiansky notes, however, that the results for mirror recognition were not that consistent for chimps, and that lower primates such as monkeys and gibbons do not appear to recognize themselves at all. Budiansky also suggests a number of alternative explanations for the observed reactions of animals in the mirror mark test. He suggests that normal grooming activity could cause the animal to unintentionally touch the marked spot, that increased grooming could be a social response to believing there is another member of the species present, or that enhanced interest in the mirror image could simply be a result of the image becoming more visually interesting after it has been marked.

Budiansky also cautions—and Patterson and Cohn agree—that self-recognition should not be equated with self-awareness. One can imagine how it would be possible to be aware of oneself and one's thoughts without being able to recognize oneself in a mirror. Prosopagnosics do it all the time. It also seems possible that one could recognize that a reflection in a mirror is oneself without possessing all the competencies described by Franklin as indicators of self-awareness. Patterson and Cohn suggest that other behavioral evidence of self-awareness be sought in addition to mirror self-recognition. They identify the following as some possibilities: using personal pronouns and proper names, referring to one's internal and emotional states (e.g., hungry, sad), taking the perspective of another, making value judgments, using humor, showing embarrassment, expressing intentions, and, once again, displaying deceptive behavior. Patterson and Cohn claim that Koko displays all of these behaviors, although some skeptics believe the researchers may be heavily over-interpreting the gorilla's behavior.

Griffin (1992) has an interesting way of attributing self-awareness to animals. He suggests that any perceptually aware animals must have the ability to be aware of particular companions and their actions: "An animal capable of perceptual consciousness must often be aware that a particular companion is eating or fleeing, that is, it must be consciously aware of both the action and who is performing it" (p.11). Talking this as a given, he adds "a perceptually conscious animal could scarcely be unaware of its own actions of eating or running away." Based on this logic, Griffin argues that perceptually conscious animals must possess at least some degree of self-awareness.

Communication, language and consciousness

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Apes and other animals may not be able to speak to tell us if they are conscious, but they *are* able to communicate with other members of their species in various ways. Communicative behavior has not typically been used to gain insight into animal minds, largely because many researchers believe that animals have no conscious control over their signals, that signals are simple responses to internal physiological states. But Griffin (1992) argues that communication signals are often purposeful and therefore can be a source of objective evidence about animals' thoughts and feelings. Of course, just like other behaviors, communication behaviors cannot provide conclusive evidence of consciousness, but they can be strongly indicative of intentional behavior and theory of mind.

Griffin provides many examples of animals that appear to have communication signals with semantic content, suggesting that the animals voluntarily choose a particular signal according to the situation and use this signal with the intention of imparting specific information to their conspecifics. One example is vervet monkeys, who have three varieties of alarm call for different types of danger: leopards, eagles, and snakes. Each call leads to a response by others that is appropriate to the type of danger announced: "leopard" calls cause the other monkeys to climb into trees, "eagle" calls cause them to retreat into thick vegetation, and "snake" calls cause them to stand on their hind legs and look around at the ground. Robert Seyfarth, who has extensively studied vervet monkeys in the wild, confirms that they and some other primate species have calls that refer to specific features of their environments and therefore function as "words" (Seyfarth, 2001). These include not just alarm calls but also words used in social situations (the meaning of these words are, unfortunately, still unknown).

Unlike Griffin, however, Seyfarth does not believe that semantic signals are evidence that animals can attribute mental states to others. Vervets appear unable to generate new "words" and they have no syntax. He suggests these abilities have not developed in the monkeys' communication systems because they lack a theory of mind. For words to be generated, the listener must know that a speaker means to use a particular sound to label a particular object. In addition, for syntax to work, listeners must be predisposed to thinking of sounds as playing functional roles in a sentence. They can then understand what the speaker means to say even when sentences are incomplete. But they must first have the ability to understand that the speaker *means* to communicate something—she has something in her mind that she is using words and sentences to get across. Without a theory of mind neither generative ability nor syntax will develop, Seyfarth concludes.

While Seyfarth argues that awareness is necessary for the development of language, others argue that language is necessary for the development of awareness, at least for the particular reflexive-type awareness that human beings enjoy. Descartes felt we could attribute consciousness to animals only if they had conversational ability in a human language (cited in Allen & Bekoff, 1997). Most writers today are willing to be somewhat more flexible than that, attributing consciousness to species that demonstrate their own non-human language. Given that a commonly accepted defining feature of language is syntax, however, no natural language has ever been discovered in apes or any other animal. Does this mean that only humans are conscious? Some would argue yes. Language gives one the ability to think in the abstract, to remove oneself from the here and now, to consider the future and the past, to remember and to make plans, to

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communicate one's ideas to others, and to understand others' ideas and feelings. Without these abilities, a creature cannot be considered conscious, many argue, at least not in the same sense that humans are.

Dennett (1996) suggests that there are two types of awareness: (1) that of language-speaking organisms and (2) that of "dumb animals". Language divides us from the rest of the animal kingdom, he argues; it creates a discontinuity in mental experience that makes us so different from other animals that there can be no comparison between our minds and theirs. Even if animals have minds—and there is no way for us to know for sure because they can't tell us—their minds must be so radically different from our own that it may be a mistake to call them by the same name, he argues.

LeDoux (1996) echoes Dennett's views when he explicitly states his position on the connection between language and consciousness: "My view is that while language is not a necessary precursor to consciousness, the presence of language (or at least the cognitive capacities that make language possible) allows a unique kind of awareness in humans" (p.333). Weiskrantz (1997) agrees that thought is important for language, but he also reminds us that language is not necessary for thought. Aphasics and infants can think without language, he points out, and we might also extend this reasoning to animals. He does concede that language adds a "quantal leap", and a quote from Darwin (1871) demonstrates why this may be the case: "A long and complex train of thought can no more be carried on without the aid of words, whether spoken or silent, than a long calculation without the use of figures or algebra." Orwell's (1949) government officials in *Nineteen eighty-four* knew what they were doing when they developed Newspeak to manipulate the thoughts of the populace.

Ape language projects

In the previous section I discussed the position of some philosophers and scientists that language, which necessarily involves syntax, sets human minds apart from animal minds. But not everyone subscribes to the same idea of what constitutes a language. Miller (1967, cited by Griffin, 1992) asserts that a fundamental aspect of human language is "combinatorial productivity", the combining of units by grammatical rules to give new meanings not expressed by the individual units themselves. Others disagree, arguing for example that "the essence of human language is not found in syntax but in the translation of meanings and the expression of these meanings to a social partner for some fundamental purpose" (Nelson, 1977, quoted in Griffin, 1992, p.224). Weiskrantz (1997) suggests that the ability to not just understand articulated sounds (which even dogs can do), but also the ability to understand new *combinations* of sounds is the measure of comprehending spoken language. And some linguists believe there is no sharp division between language and what they call paralanguage, or vocal and kinetic gestures.

In studies to determine apes' language capability, researchers have found evidence suggesting apes may at least meet the criteria for possessing language according to the more inclusive definitions (Savage-Rumbaugh et al., 1993, provide a comprehensive history of ape language research). Gorillas and chimpanzees have learned to use sign language and lexical keyboards, mainly to request desired items such as food but also to respond to experimenters' questions and to state their intention to perform particular actions. The star pupil of all ape

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language projects to date is arguably Kanzi, a bonobo raised at Georgia State University's Language Research Center from the age of six months old (Savage-Rumbaugh et al., 1993; 1998).

The interesting thing about Kanzi is that he was not actually a pupil. He was simply along for the ride, literally, clinging to his mother Matata as she received instruction from Savage-Rumbaugh and her team in the use of a lexical keyboard. Matata's education failed, but as soon as she was moved temporarily from the Center Kanzi began spontaneously to use the keyboard to communicate with researchers, indicating he had learned more from observation than most of the older apes could pick up in years of rigorous training. Kanzi never did receive explicit language training, but after his propensity became known Savage-Rumbaugh and her colleagues exposed the young bonobo to a language-rich environment. In addition to using the keyboard at every opportunity, the researchers spoke to Kanzi as one would to a young human child, verbally identifying objects in his environment, describing their actions as they were carrying them out, and the like. By the time he was eight years old Kanzi had developed the apparent ability to understand human speech as well as, and in some cases better than, a 2-year old child (Savage-Rumbaugh et al., 1993).

Based on Kanzi's language abilities, Savage-Rumbaugh asks why shouldn't we grant syntactic competence to a sibling species? Kanzi, and other bonobos and chimps after him, have displayed abilities to process both semantic and syntactic information in sentences. This apparent understanding occurs even when the sentences are novel and are presented under controlled laboratory conditions in which the possibility of external cueing by the experimenter has been eliminated. For example, asked in one trial to "make the snake bite the doggie" (toy snake and toy dog) and in another trial to "make the doggie bite the snake" Kanzi performed the correct action both times (unlike the 2-year old child tested under the same conditions, who misunderstood the agent and bit the doggie herself). Kanzi also proved himself capable, using his keyboard, of using novel combinations of words to produce more complex requests. For example, he would point to the symbols for "group-room" and then "Matata" to indicate that he wanted to be taken to the common room where he believed his mother Matata to be. Savage-Rumbaugh suggests "The appearance of 'sequenced words' antedates the emergence of syntax proper and, like syntax, serves to create new meanings that are not simply an additive result of the separate words" (Savage-Rumbaugh et al., 1993, p.41).

The implications in all this are that Kanzi, and a few others since him, can be said to be capable of, if not syntax itself, then at least some kind of simple precursor to it. If further research succeeds in discovering full syntactical capabilities in apes, one has to wonder about the reactions of those who claim language makes humans unique. Evidence for continuity in language between apes and humans also argues for continuity in consciousness, not the sharp distinction that many insist upon.

Neuroscientific evidence

The continuous view of consciousness is based on the evolutionary perspective. Just as there is biological continuity in all species, proponents of the view argue, so there must also be continuity in mental experience. Based on the fact that most humans are neurophysiologically very

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similar to one another, most people feel sure that other people's mental lives cannot be much different from their own. We feel less sure about the mental lives of apes, however, because although they are similar to humans there are important differences.

LeDoux (1996) points out that our brains are much larger than all other animals for our body size, especially the cerebral cortex. Human brains are three times larger than an ape's of equivalent body size. In addition, the size of the human prefrontal cortex outstrips that of other primates, and other mammals may not possess one at all. LeDoux believes that the expansion of the cortex in mammals was responsible for the emergence of awareness because it allowed organisms to relate several things at once (the way a stimulus looks, memories of past experiences with that stimulus, and so on.) Of course, this does not preclude the possibility that some animals are more aware than others, or that humans may experience a unique form of awareness.

Despite the differences, interesting similarities between human and animal brains have also been found. Griffin (1992) reports evidence that other mammals have brain areas homologous to Broca's and Wernicke's areas in the human brain. Control of singing in songbirds has been found to be lateralized, for example, just as speech is in humans. And in split-brain experiments with monkeys the left hemisphere was better at discriminating lines while the right was better at discriminating faces, matching the results found with humans. Finally, Japanese macaques appear to have a right-ear (left auditory cortex) advantage for discriminating vocalizations of peers. Such findings are intriguing because they indicate continuity in the neuroanatomy of animals and humans and suggest a possible continuity in mental experience as well.

While it looks as though animals, and especially apes, may have *at least some* of the same equipment necessary for *at least some* types of awareness, until we know where or how consciousness arises in the brain we cannot be sure. Unfortunately this question is far from being answered. Most researchers operate under the assumption that consciousness is a higher brain function arising somehow from the workings of the cortex. But Panskepp (1998) puts forward a radically different theory: that the fundamental core of consciousness, the sense of 'I-ness' or 'self', is contained in the ancient midbrain regions we share with all other mammals. Panskepp believes these regions allowed our mammalian ancestors to experience what he calls 'primary-process affective states', and they are the base on which more recent forms of consciousness were built.

Panskepp cites neuroscientific evidence to support his theory. Very small lesions to the subcortical areas of the brain can affect human consciousness, he writes. And split-brain patients have undisturbed primary-process consciousness: 'Despite massive hemispheric disconnection, the deep and essential coherence of each person's personality and his or her sense of unity appears to remain intact' (p.307). Also, just like normal subjects, split-brain patients cannot distribute attention across two tasks simultaneously, suggesting that limits on attention are the result of a central component that influences both hemispheres. Finally, while damage to higher brain areas destroys specific abilities, it does not compromise the victim's coherent sense of self.

Based on these indicators, Panskepp theorizes that the sense of self, the most basic form of consciousness, resides in the subcortical areas of the brain while the more developed forms of consciousness and its specific contents are contained in the higher brain centers. This unconventional view is not inconsistent with much of the research discussed throughout this

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paper. It suggests that consciousness is present to some degree in all mammals, but that consciousness can become elaborated as one proceeds up the phylogenetic scale and the cortex becomes more developed. And it leaves open the possibility that human consciousness, through the involvement of much more highly developed cortical centers, can be qualitatively different from the consciousness that animals may experience.

Conclusion

It is clear that there is much to learn about consciousness before we can properly judge whether or not apes possess it. There is still much disagreement on what consciousness is, on the most useful way of carving up the concept, and even on whether consciousness is best represented as a continuum of mental experience or as something that you either have or you do not. Most writers appear to agree that human consciousness is necessarily different from ape consciousness due to our unique language abilities. However, the recent results of ape language projects may begin to call even this widely held view into question.

It will be interesting to observe whether humankind can retain its special status on earth in the face of growing evidence that apes' mental lives may not be as different from our own as we think. When Jane Goodall discovered chimpanzees using tools Richard Leakey commented that we would now have to redefine tool use, redefine man, or welcome chimps into our species (Goodall, 1984). We redefined man. Ristau (1999) is probably right in predicting that whatever kind of language science and the press decide apes have, humans will still remain unique.

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