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ANIMAL SELF-AWARENESS

Types, Distribution, and Ethical Significance

David DeGrazia

Self-awareness is often assumed to be a single phenomenon that underlies special moral status. It is also commonly thought to be exclusively human, or nearly so, extending perhaps to a few nonhuman species. These ideas are integrated in Locke's classic investigation of personhood, in which persons are taken to be rational beings who are aware of themselves as persisting over time—making them appropriate subjects of moral accountability (Locke 1694, Bk. II, chap. 27). The idea that self-awareness is a single phenomenon is also reflected in the idea, embraced by many scholars, that a good test for its presence is the mirror self-recognition test (Gallup 1970, 1977).¹ In this chapter, I challenge the two-pronged assumption that self-awareness is a single phenomenon that is more or less exclusively human. I do so in distinguishing and examining four types of self-awareness: narrative identity, introspective awareness, social self-awareness, and bodily agential self-awareness. In examining each type, I address its apparent distribution in the animal kingdom. Finally, I close with brief reflections on the ethical significance of the four types of self-awareness.

Narrative Identity

Narrative identity is a rich sort of self-conception that is characteristic of human beings of sufficient maturity. It involves a sort of biographical self-awareness—an awareness of one's own life as comprising something like a story with most or all of the following elements: a richly detailed set of memories, values and priorities, awareness of important relationships, ongoing endeavors, and intentions or plans for the future. One's narrative identity can help to guide one in making difficult life choices (Glover 1988: 152) and can be threatened in an identity crisis (Schechtman 1996: 74). The idea of narrative identity might also help to flesh out the somewhat vague Lockean concept of a person: perhaps persons are all and only those beings who have a narrative identity.

Yet, even if the idea of narrative identity is more determinate than the concept of a person, it too has blurred boundaries. Still, it seems reasonable to suppose that human beings ordinarily begin to possess such a self-conception when they are three or four years old.² Of the four types of self-awareness I distinguish, this is the most likely to be exclusively human. But, in order to determine whether narrative identity is unique to human beings, we cannot recline in the *a priori* armchair, as too many philosophers still do. We must head for the *a posteriori* jungle of available evidence.

Given the conceptual richness of a narrative identity, one might speculate that *only* language users have the requisite cognitive sophistication but also that *any* creature who is a genuine language user is likely to possess a narrative identity.³ Thus, in considering the possibility of nonhuman narrative

identities, let us begin with the few nonhuman animals (hereafter, simply “animals”) who have had significant success in learning a language. I consider apes who, as far as I know, have achieved the most extensive linguistic competence.

The bonobo Kanzi learned, by observation without explicit training, to use a keyboard on which his mother was being trained. Although Kanzi’s comprehension abilities exceed his productive language abilities, he generates strings of two or three words that have clear meaning in context. Perhaps most impressive, however, is his comprehension of spoken English (even when hearing through headphones without the benefit of visual cues). He can comprehend novel utterances, such as “Take the vacuum cleaner outdoors,” and can distinguish strings with the same words but different orders, displaying a type of syntactical mastery—for example, “Pour the coke into the milk” and “Pour the milk into the coke” (PBS 1995; Savage-Rumbaugh 1986; Savage-Rumbaugh and Brakke 1990).

The gorilla Koko, who lived in an environment of American Sign Language (ASL) and spoken English, used a vocabulary of hundreds of signs to produce strings of three or more words. The English vocabulary she understood was larger. Interestingly, she signed to both humans and other language-trained apes. Among her novel definitions are the following: “What’s an insult?” “THINK DEVIL DIRTY.” “What’s a smart gorilla?” “ME.” “When do people say darn?” “WORK. OBNOXIOUS.” When asked what happened on her birthday, she signed, “OLD GORILLA.” Koko also apparently expressed remorse for having bitten a companion on the previous day, signing “SORRY BITE SCRATCH” and “WRONG BITE,” explaining that she was mad at her companion (Patterson 1978; Patterson and Gordon 1993).

The late orangutan Chantek mastered more than 150 signs of ASL and learned, without training, how to comprehend much spoken English. He sometimes signed for manipulative purposes, for example signing *dirty* as a pretense to go to the bathroom in order to play with the washing machine. He signed for objects that were not immediately perceivable—for instance, to ask to go to the backyard to look for a favorite cat. Sometimes he created novel strings, such as “DAVE MISSING FINGER” for a person who had lost a finger and “EYE DRINK” for contact lens solution (Miles 1993).

Assuming these descriptions of the three apes’ linguistic feats are representative of their acquired language capacities, Kanzi, Koko, and Chantek are fairly promising candidates for animals who have narrative identities. So far, we have considered the possibility of nonhuman narrative identity through the lens of linguistic competence—which young human children have in some significant measure around the time they seem to acquire narrative identities. But we should be open to the possibility that narrative identity can sometimes emerge in cognitively sophisticated creatures who lack linguistic competence. The most promising candidates would seem to be great apes and cetaceans (dolphins, porpoises, and other whales), although elephants may not be far behind. Following are some details about their lives and capacities.

Chimpanzees, bonobos, and gorillas are highly social creatures (in contrast to the semisolitary orangutans). The social lives of these great apes feature long-term relationships, dominance hierarchies, awareness of kin relationships, non-kin-based alliances, and the tracking of significant interactions, such as fights, groomings, and instances of assistance with particular group members. (For helpful overviews, see Goodall 1986; de Waal 1997; Parker et al. 1999; Russon et al. 1996.) Their penchant for deception, planning, scheming with others, and similar behaviors have led primatologists to characterize some great apes—at least chimpanzees—as “political” (de Waal 2000). With this general understanding of their behavior, it seems plausible to assume that they have fairly extensive episodic memories, substantial social awareness, and perhaps even intentions for the nonimmediate future, such as a plan to topple the current alpha male with the help of a particular group member. On this basis, it might be reasonable to suppose that they have narrative identities. But I leave this open as a possibility, neither confirmed nor disconfirmed.

The case for narrative identity in cetaceans is comparably strong. Their lives feature long-term relationships, dominance hierarchies, intense mother–calf bonding, adult protection of the young,

and tracking of significant interactions with other group members. (For background, see Mann et al. 2000). Meanwhile, their natural communicative abilities—or, at least, those of some species—may exceed the complexity found in apes' natural vocalizations and hand gestures. Dolphins recognize each other by their unique “signature whistles” and may call each other by imitating others' whistles; the latter are also modulated, apparently conveying emotional states. Certain bodily postures and gestures seem to convey information about upcoming movements or social information, such as “I want to interact with you.” It has been argued, rather plausibly, that because the ocean affords no hiding places from predators, cetaceans evolved under especially intense selective pressure to develop the capacity for cooperation. (For a good overview of dolphins' social lives and communicative abilities, see White 2007, chap. 5; see also Pryor and Norris 1991). On balance, I would say that the possibility of narrative identity in cetaceans is at least as strong as it is in the case of great apes. But, with the information available, we can only speculate. As we will see, there is more rigorous evidence for other types of self-awareness in particular animal species.

Introspective Awareness

Introspective awareness is awareness of one's own mental states, such as believing something, not being sure about something, feeling angry, or being hungry. To head off confusion, we must distinguish *having* a mental state, such as a belief or feeling, from *being aware that* one has that mental state. Although some mental states, such as pain or hunger, may be intrinsically conscious,⁴ having such a state is distinguishable from the higher-order awareness, or consciousness, *that one is having the state*. Consider an example. Assuming a human newborn can feel pain prior to possessing even the most rudimentary self-awareness, the infant will at first feel pain without awareness *that* she is feeling pain. She simply feels something that hurts without awareness of herself as a distinct being who is subject to such feelings. On the other hand, as soon as an infant—or any creature—acquires an awareness of himself as a distinct being who is subject to such bodily feelings (see later discussion of bodily agential self-awareness), it makes sense that the experience of intrinsically conscious states such as pain and hunger will ordinarily be accompanied by the introspective awareness of having those states.⁵

Because introspective awareness has a second-order character, it is a type of *metacognition*. Another type of metacognition, the attribution of mental states to other individuals—requiring a “theory of mind”—is sometimes claimed to be necessary for introspective awareness, and vice versa. But I will set aside this thesis and focus on evidence for introspective awareness.

If any animals have a narrative identity, as discussed in the previous section, their self-conception will presumably include not only memories and intentions but also awareness of having these mental states. For example, if a gorilla remembers being thrashed by another gorilla, it seems reasonable to assume that he recognizes the recollection *as a memory*—that is, as indicating what happened to him earlier. Without such a recognition, memories would seem to be useless. Before proceeding, let me clarify that in speaking of memories I mean, more specifically, *episodic memories*, conscious experiences in which one recalls having some earlier experience. These are to be contrasted with *semantic* memories, with which one recalls some fact (without necessarily recalling any associated experience)—for example, the fact that Mexico City is a capitol or even a more personal fact such as that *I saw this actor in a movie* (although I can't remember what movie or the experience of seeing it). Perhaps it is possible for a bird to remember (semantically) that there is food in some place where she left it whether or not she has an episodic memory of leaving it there. My present claim is that episodic memories would be useless if a subject were not introspectively aware of now having an experience that represents her past.

Meanwhile, it seems incoherent to posit an intention that its subject does not recognize as an intention. Here, in referring to “intentions” I have in mind a type of conscious experience about what one might do in the future rather than an unconscious disposition to do something. These

reflections suggest that some mental states, such as (episodic) memories and (conscious) intentions, have temporal self-awareness—an awareness that one exists over time—built into them. They also suggest that these mental states implicate introspective awareness. Again, memories and intentions would be useless—if they are even possible—without an awareness that one is having these mental states and of what they represent.

Our discussion in the previous section left open whether any animals have narrative identities. Yet, if the reasoning of the previous paragraph is correct, then not only animals with narrative identities, but any animals with memories or intentions would have some introspective awareness. There is considerable evidence that some animals—various mammals including rodents and some types of bird—have episodic memories (see, e.g., de Kort et al. 2005; Babb and Crystal 2005; Schwartz et al. 2005). There is also impressive evidence that certain animals—including primates, rodents, and some birds—plan for the future, implicating intentions, in service of longer-term goals (see, e.g., Raby et al. 2007; Feeney et al. 2011; Roberts 2012). Moreover, if the reasoning presented four paragraphs earlier is correct, then animals with even a rudimentary awareness of themselves as distinct entities subject to certain feelings will typically have introspective awareness of having those feelings when they occur. That may suggest that introspective awareness, despite its second-order character, is very widespread in the animal kingdom—extending beyond mammals and birds to include reptiles and possibly more primitive classes of animals (see later discussion of bodily agential self-awareness). At this point, however, I focus on more direct evidence of introspective awareness in certain animals.

Some of the signings of Koko the gorilla (Patterson and Gordon 1993) may have indicated introspective awareness. Once, when angered, Koko is reported to have signed, “RED MAD GORILLA.” On another occasion, she repeatedly asked a companion for juice but was rebuffed. Resorting to drinking water through a straw from a pan on the floor, she allegedly signed, “SAD ELEPHANT.” If these anecdotes are accurate, they strongly suggest that Koko had some awareness of her feelings and could express them linguistically.

Let us turn now to experimental evidence, some of which emerged in studies of monkeys by David Smith and colleagues (for summaries, see Smith and Washburn 2005; Phillips 2006). Monkeys were trained to manipulate a joystick to select answers in discrimination tests about visual patterns on a computer screen. Incorrect answers elicited “time-outs” (delays before further trials), which they hated, while correct answers elicited food pellets, which they liked. Later, the monkeys learned the option of choosing an icon for “pass.” If they chose this option, they received no pellet but proceeded immediately to the next trial, a result less desirable than immediate food but preferable to a delay without food. Facility with the pass option, which they often used in difficult trials, afforded initial evidence that the monkeys assessed their own level of confidence and perceived that they were *unsure*—an instance of introspective awareness.

Other explanations of the monkeys’ behavior are possible. They might have been conflicted about which answer was correct and selected the pass option by default, or perhaps they were simply trying to move faster to a new trial. But further findings cast doubt on such skeptical responses. First, less cognitively complex animals, rats, failed to learn the pass option in one trial (Smith and Schull 1989) while a later trial was ambiguous (Crystal and Foote 2009), suggesting that the monkeys might be performing a higher-level cognitive feat. Second, researchers modified the monkey experiments so that they received food or delays only following a series of trials, rather than after each one. Third, later trials had monkeys demonstrate the ability to *remember* previously shown images rather than discriminate among present images (Hampton 2001, 2005). So monkeys who mastered the task apparently tried to recall an image, compare it with a current image, and decide whether there was a match—suggesting introspective awareness of having a representation of the earlier image. Finally, subsequent research suggested that monkeys who learned to use a pass response in perception tasks could immediately do the same not only in different perception tasks but in memory tasks as well (Kornell et al. 2007).

In view of this experimental evidence for introspective awareness in monkeys, it should not be surprising that similar evidence emerged in trials involving a dolphin, who chose a “pass” option in difficult trials and hesitated before doing so (Smith et al. 1995). Kristin Andrews comments: “This squares well with my own experience working with dolphins, who would respond to difficult tasks by swimming in a tight circle between the two choices before settling on one” (Andrews 2015: 74). If monkeys and dolphins can be aware of their own uncertainty, one might expect the same of great apes—and not just successful language pupils. This hunch was apparently confirmed in a study involving eight chimpanzees, seven gorillas, four bonobos, and seven orangutans, about which the author concludes, “[S]ubjects knew that they could be wrong when choosing” (Call 2010).

Social Self-Awareness

Social self-awareness is awareness of oneself as occupying a particular position within one or more social relationships. It appears to be characteristic of highly social animals including many or most mammals and perhaps some birds.⁶ I contend, a bit conservatively, that the members of many mammal species have social self-awareness. The evidence for this capacity consists of individual behavior within groups that seems best explained by the animals’ possession of social self-awareness.

Before proceeding, a more explicit characterization of this type of self-awareness might be helpful. Any type of self-awareness is expressible through a sentence with a first-person pronoun, whether or not the being in question actually thinks linguistically. For example, a person’s narrative identity might include pieces of self-awareness expressible by the sentences “I am the grandson of a Sicilian immigrant” and “Learning Italian is on my bucket list.” Two bits of introspective awareness might be expressed as “My toe hurts” and “Glib talk of social construction irritates me.” How about social self-awareness? A chunk of such awareness might be rendered in English as “He is more powerful than I; we have groomed each other; we are allies, so I will help him if he gets in a fight.” Exactly how nonlinguistic beings mentally manifest such awareness I don’t know. But much behavior seems best explained by the assumed possession of social self-awareness.

Many mammals have complex social lives featuring group living, dominance hierarchies or more equitable relations, a sense of kinship to particular others, shifting alliances, and the like. Individuals often keep track of salient transactions with others, such as fights and episodes of grooming. Each social group member needs to understand her position in the group and her relationship to specific others as well as any expectations that come with these relationships—for example, being an ally to another member of a primate social group might entail coming to his or her assistance in a fight. Such understanding embodies social self-awareness. To the extent that episodic memory is involved—for example, of having been recently groomed by him—such understanding also implicates some temporal self-awareness and, assuming a particular memory is recognized *as a memory* (as discussed earlier), introspective awareness. Following are some observations about particular mammal species.

It is well known that wolf packs feature complex social dynamics. Moreover, domestic dogs—a species that evolved from wolves—appear to engage in pack behavior in human households. If there are other dogs, they will work out a dominance hierarchy. If there are no other dogs, the lone canine will typically work out who is the “alpha” among the human companions and try to forge a strong alliance with that individual. Meanwhile, despite being less actively social than dogs, domestic cats also work out dominance hierarchies among themselves.

There has been extensive ethological study of primate social life. Cheney and Seyfarth’s (1990) investigations of vervet monkeys, for example, demonstrate that they know who is a relative, who is dominant, who is a relative of a dominant individual, and how other group members stack up in the hierarchy. The authors conjecture that vervets’ innate disposition to sort others in family structures and hierarchies evolved to enhance the ability to predict conspecifics’ behavior (Seyfarth and Cheney 2003). This conjecture seems equally plausible in the case of other highly social species.

Earlier we discussed some aspects of apes' social lives in discussing the possibility of their having narrative identities. To supplement the earlier discussion, chimpanzees, bonobos, and gorillas recognize individual group members, recall favors bestowed as well as grudges, have enduring relationships, and build and shift alliances (Goodall 1986; Stanford 2001, 2008).⁷ The structure of social life within great ape species reveals differences, however. While chimpanzees are very hierarchical and frequently violent, for example, bonobos are more egalitarian and cooperative, communicate with recreational sex, and excel at forging alliances (Stanford 2001, chap. 1).

Despite being more difficult to study due to their aquatic terrain, cetaceans have been found to have exceptionally complex social lives, as noted earlier. The following statement from an eminent dolphin researcher will fill out our sketch:

Bottlenosed dolphins as well as many other species of toothed whales (odontocetes) live in complexly organized social units (e.g., Connor et al. 1992). To function effectively within these units, the young dolphin must undergo extensive learning about the conventions and rules of the society, about cooperative and collaborative activities, and about the identities and even personalities of group members and associates (Herman 1991). The protracted period of development and dependence of young dolphins on their mothers and other group members allows the time and opportunity for extensive social learning to take place.
(Herman 2002, at 275)

The foregoing considerations about the social lives of various mammal species support the attribution of social self-awareness. We have considered wolves, domestic dogs, vervet monkeys, three great ape species, and cetaceans with special attention to dolphins. Without entering into details we may confidently add elephants (see, e.g., Wittemyer and Getz 2007) and probably some other types of mammals. The upshot is that social self-awareness appears to be rather widely distributed in the animal kingdom. As we will find in the next section, another type of self-awareness is distributed far more widely than social self-awareness.

Bodily Agential Self-Awareness

The final type of self-awareness that I consider is what I call *bodily agential self-awareness*: an awareness of one's own body as importantly distinct from the rest of the environment in being directly connected with certain feelings and subject to one's direct control in acting—in short, in being *one's own*. Because of this type of self-awareness, one does not attempt to eat oneself. And one pursues goals. Bodily agential self-awareness, as I understand it, typically includes all of the following: (1) *proprioception*: an awareness of body parts, their position and movement, and overall body position (Bermudez 1998, chap. 6); (2) various *sensations* (e.g., pain, hunger, thirst, sensations of warmth, cold, or tactile pressure) that provide information about what is happening to the body; (3) *spatiotemporal awareness*: an awareness of where one is in relation to nearby objects and of one's persistence through time; and (4) *agential awareness*: awareness that one can do things to control one's body and interact with the environment. These specific forms of awareness, adding up to bodily agential self-awareness, are paramount to creatures that can sense features of their bodies and the environment and respond to this information with flexible behaviors.

For the sake of clarifying this type of self-awareness, consider a creature that lacks it despite being able to sense certain salient conditions and respond in survival-enhancing ways. Suppose the creature can sense the need for food, the need for water, and the presence of noxious stimuli on a body part—and, if sentient, can *feel* hunger, thirst, and pain—and, upon sensing these stimuli, locates food and eats it, locates water and drinks it, and withdraws from the noxious stimulus. Imagine that these three types of action are mechanical, performed automatically in response to relevant sensory stimuli—for

example: sensing the need for food + sensing (e.g., by smell) the presence and direction of food → moving toward the food and consuming it. The behavior of this creature has a stimulus-response character (which may or may not be attended by sentience and therefore the experience of feelings). Per our stipulation, the animal lacks a sense of itself as a distinct entity, located within a mental map of space, persisting through time, and capable of acting upon the world in a self-controlling way.⁸ In brief, the animal lacks an integrated, internal model of itself within a broader world. This sense of itself, or model, would constitute bodily agential self-awareness.

Now consider a quotidian human example. An infant discovers that every time she touches her foot, she feels something both in her hand and in her foot. When she grabs her plastic block, she feels something in her hand but not in the block. These and similar experiments gradually engender the realization that her hands and feet are special objects—they are part of *her*. The infant also realizes that, if she wants to have that “foot” feeling again, she can reliably produce it by grabbing her foot. The infant has the beginnings of bodily agential self-awareness.

Many animals do as well. Which ones? Although I do not try to answer this question comprehensively, I argue that (1) at least reptiles, birds, and mammals have bodily-agential self-awareness and, perhaps surprisingly, (2) some insects may as well.

My point of departure is a theory that consciousness first evolved in early amniotes, the clade that comprises reptiles, birds, and mammals. Michael Cabanac and colleagues (2009) hypothesize that as land-based lifeforms evolved, “existence required more and more stimulus-response pathways; eventually, a point was reached where it became more efficient, in terms of speed and flexibility, to route all decision making through a single mental space,” with a criterion of maximizing expected net pleasure. These newly conscious creatures were capable of pleasure and pain, affording them an experiential basis for selecting behaviors; as the authors put it, “hedonic experience . . . is the common currency that allows motivations to talk to each other” (ibid.: 269). This account focuses on consciousness, but the model of consciousness suggests at least a rudimentary bodily agential self-awareness, as will become clear in a moment.

Cabanac and colleagues (2009) hypothesize that consciousness emerged as an efficient solution to the need to integrate information from multiple sensory modalities and respond flexibly in survival-promoting ways. For example, instead of mechanically retreating from painful stimuli while seeking food, a snake might endure some pain in order to reach the only nearby food source. This sort of behavior is called a “motivational trade-off.” (As I understand such choices, they might not be restricted to the hedonic currency of various kinds of pleasant and unpleasant experiences as in Cabanac et al.’s account. For example, trading off between the values of [1] avoiding painful stimuli and [2] finding and consuming food—whether or not doing so is pleasant or is expected to maximize net pleasure over time—would qualify as a motivational trade-off so long as both are health-promoting and innately motivating for the creature.) Consistent with their hypothesis that consciousness and sentience emerged in amniotes, the authors ran trials involving “taste aversion learning”—in which animal subjects could learn to associate a food’s pleasant taste with the indigestion that followed, thereafter avoiding the food—and found reptiles but not amphibians to demonstrate this type of learning (Pardis and Cabanac 2004). Moreover, the authors cite literature suggesting that reptiles, when handled, produce physiological responses characteristic of stress (an emotional response)—whereas amphibians do not (Cabanac et al. 2009: 268).

In addition to the authors’ arguments that present-day amniotes have the sort of integrated consciousness they describe, there is ample independent evidence that (at least) reptiles, birds, and mammals are capable of performing intentional actions in pursuit of goals. This capability requires bodily agential self-awareness. Rather than review this evidence here, I refer the reader to works in which I do so (DeGrazia 2009: 202–206; DeGrazia 1996, chap. 6) and here offer a single plausible example. A dog runs through the house to the dog door with the intention of exiting the house and entering the backyard in order to get the bone he left there earlier. This dog wants to chew on the bone,

remembers having left it outside, has a simple plan for getting it, locates himself in a mental map, and recognizes that he can take action to get what he wants. He has bodily agential self-awareness.

Interestingly, Cabanac and colleagues' assertion that amphibians lack what they call consciousness and I construe as bodily agential self-awareness received some support in an experiment performed almost half a century ago. By way of background, amphibians evolved from fish prior to the emergence of amniotes and include such animals as frogs, newts, and salamanders; they live first in water and then, after a physical metamorphosis, the rest of their lives on land. Things get interesting with a familiar type of amphibian: frogs have one visual stream that allows them to detect and snap at moving objects such as flies and a distinct visual stream that enables them to navigate around barriers. A lack of unified visual perception was demonstrated in an experiment in which surgical rewiring in a frog's brain resulted in a right-left reversal of prey detection without affecting the ability to perceive right and left for purposes of walking around objects (Ingel 1973; discussed in Godfrey-Smith 2016: 89). Although this is just one experiment, it coheres with the hypothesis that frogs—and perhaps amphibians more generally—lack an integrated consciousness of the environment and of themselves acting within it and therefore lack bodily agential self-awareness.

I have argued that at least reptiles, birds, and mammals characteristically possess bodily agential self-awareness. While recognizing that there is some evidence that amphibians lack such integrated awareness, I do not claim with Cabanac and colleagues that *only* amniotes have this endowment. For one thing, fish comprise such an extraordinarily diverse class of animals (Allen 2013: 26) that it seems possible that some presently living fish have a more integrated awareness of themselves than amphibians—or, at least, frogs—do, even though amphibians evolved out of certain fish species. Moreover, there is ample evidence that some cephalopods, especially octopuses, have a high level of cognitive sophistication, and I am confident that the evidence, properly interpreted, would support the attribution of bodily agential self-awareness to these creatures—although I won't defend this claim here (but see Godfrey-Smith 2016). What I argue, building on the work of two scholars, is that there is a significant possibility of bodily agential self-awareness in insects.

Andrew Barron and Colin Klein (2016) have recently argued that insects are conscious. Consciousness, as I conceptualize it, is simply subjective experience or awareness. Although the authors originally define consciousness as I do, their model of what consciousness involves bears some similarity to Cabanac and colleagues' model and embodies what I have called bodily agential self-awareness.

In vertebrates, Barron and Klein argue, the capacity for subjective experience is supported by integrated midbrain structures that create a neural model of the state of a mobile creature in space—a representation of the world from the creature's perspective. Structures in the insect brain function analogously, according to the authors, in relevant respects to the mammalian neocortex—a thin layer of neurons on the outer part of the cerebrum that is thought to be critical to the experience of consciousness in mammals. (It is worth noting that the minuscule brain of the bee, an insect to which Barron and Klein devote much attention, has nearly a million neurons, making it far denser in neurons than the human neocortex [Tye 2017: 152].) In both vertebrates and insects this sort of integrated control system evolved to deal efficiently with (1) the refference problem (the need to distinguish among the barrage of sensory inputs those that come from one's own actions and those due to the external world),⁹ (2) the need to navigate to places beyond one's immediate sensory range, and (3) the need to integrate information from multiple sensory modalities. As Barron and Klein (2016: 4902) state, “[f]or active animals with well-developed spatial senses, it is computationally more effective to resolve the refference problem once for a unified sensory model than to resolve it in a dispersed and peripheral way for each sense independently.” They further contend that the midbrain's integration of different types of information “provides the capacity to resolve competing behavioral priorities or motivations and rank needed resources by both urgency and availability” (ibid.). This claim is consonant with Cabanac et al.'s thesis that consciousness permitted a unified basis for responding flexibly and efficiently to multiple demands on an organism.

I do not know whether Barron and Klein are correct that insects are conscious in a way that would entail bodily agential self-awareness. All I claim is that, given Barron and Klein's theorizing and the evidence they cite, the possibility is worth considering. Many scientists and philosophers (including me) have argued, or simply assumed, that insects cannot possibly have any form of self-awareness. But, as seekers of knowledge, we have to respect the evidence and the world, including its creatures, as they are—not as we might prefer or assume them to be. I consider it an open question whether any or all insects have the rather basic sort of self-awareness we have considered in this section.

On the Ethical Significance of Different Types of Self-Awareness

As noted at the outset, self-awareness is often assumed to ground special moral status and to be exclusively human, or nearly so. The idea might be that, while sentient creatures have moral status, self-aware beings, such as humans and perhaps some great apes, have *full* moral status. The arguments of this paper challenge such thinking by distinguishing several types of self-awareness and demonstrating that some of them extend deeply into the animal kingdom. But these claims are compatible with the idea that self-awareness, in one or more of its varieties, bears moral significance. In this final section, I briefly consider this possibility by noting how the various types of self-awareness are tied to morally significant interests.

As we found in the previous section, a wide class of animals has bodily agential self-awareness. These animals are not only sentient beings, grounding an interest in experiential well-being, but also agents—beings with aims or goals. Their agency grounds some sort of interest in being able to pursue their aims, although different theories will conceptualize this interest in different ways. A libertarian-leaning animal ethics might assert that all such animals have rights to freedom of movement, bodily integrity, and any other conditions vital to agency. A more consequentialist animal ethics might withhold the rights claim while acknowledging the conditions of agency as morally important interests of animal agents—these animals' lives generally go better when they are permitted to function as agents. Whether the conditions of agency are intrinsically important to the animals' well-being, as objective value theories might assert, or important only because instrumental to the animals' experiential welfare, as hedonistic value theories would claim, is a further issue that will divide ethical theories that recognize the moral status of sentient animals and the importance of agency to animal agents.

Earlier we found that members of highly social species exhibit social self-awareness. These animals are not only sentient beings and agents but also highly social creatures. As such, they have interests in being able to socialize with group members and in the maintenance of beneficial (as opposed to antagonistic) relationships. Whether we construe these interests as objects of rights or simply as morally weighty interests, they justify a strong presumption against isolating the animals in question or interfering with the continuation of their beneficial relationships. Thus, for example, highly social animals kept in captivity—whether in zoos, human homes, stalls, or laboratory settings—must have social access to appropriate companions and must not be isolated from such company absent extremely compelling grounds for such separation. This observation condemns primate maternal-deprivation studies and, except in special circumstances (e.g., involving a dangerous infectious disease), the isolation of primates, dogs, and other social animals in separate cages.

Introspective awareness is less straightforwardly connected with important interests than are bodily agential and social self-awareness. However, let me suggest two connections. Introspective awareness seems to facilitate (1) agency and the pursuit of one's goals and (2) social living. For example, in one of the testing paradigms discussed earlier, a monkey who is aware of not being sure which answer is correct can select the "pass" option rather than simply guessing, thereby advancing her interest in getting as much food as possible over a series of trials. Meanwhile, if I face a looming deadline for a manuscript review and notice that I feel ambivalent about working on it now, I can take steps (e.g., a burst of exercise) likely to increase my desire to work on it. Introspective awareness also facilitates

social success. For example, if I know that my colleague's comment has made me feel defensive and that I'm prone to say things I later regret when feeling this way, I can switch into mindful-acceptance mode, keep my mouth shut, and decide tomorrow whether any response to the comment is worthwhile. In comparison with reacting impulsively when feeling defensive, the strategy just described is more likely to facilitate a good working relationship with my colleague. Introspective awareness has advantages. So creatures who are introspectively aware have an interest in retaining this capacity. This confirms the obvious thought that we should not damage animals' introspective capacities.

The possession of a narrative identity, meanwhile, generates a very strong interest in remaining alive. Whereas any sentient creature with the prospect of continuing a good life may be harmed by death—insofar as death deprives her of further goods—an individual with the sort of biographical self-conception involved in a narrative identity typically loses much more from premature death. Such an individual loses the opportunity to bring to completion whatever projects make her life meaningful in her own eyes. Such projects, using the term broadly, might include starting a family and engaging in family life for half a century or producing a body of music or scholarship or retiring and giving oneself over to a satisfying mixture of leisure and tutoring in public schools. The biographical shape of life for a being with a narrative identity is perhaps the strongest ground for a right to life—by which I mean an exceptionally stringent moral claim not to have one's life taken involuntarily. If we have reason to judge that some nonhuman animals have narrative identities, then we have reason to ascribe to these animals a right to life in this strong sense of the term.

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Further Readings

- Allen, C., and Trestman, M. (2016) "Animal consciousness," *Stanford Encyclopedia of Philosophy* (<https://plato.stanford.edu/entries/consciousness-animal/>), first published 12/23/95, substantive revision 10/24/16.
(A comprehensive overview of the evidence and methodological issues bearing on the attribution of consciousness to nonhuman animals.)
- Cavalieri, C., and Singer, P. (1993) *The Great Ape Project: Equality Beyond Humanity*, New York: St. Martin's.
(Contains a wealth of scientific information, accessibly presented, about the evolution, minds, and social lives of the different species of great apes.)
- de Waal, F. (2016) *Are We Smart Enough to Know How Smart Animals Are?* New York: Norton.
(An accessible, well-documented volume written by a leading primatologist on the surprising richness of animal cognition.)
- Godfrey-Smith, P. (2016) *Other Minds: The Octopus, the Sea, and the Deep Origins of Consciousness*, New York: Farrar, Straus, and Giroux.
(An exploration of the evolution of consciousness and self-awareness with special attention to cephalopod minds.)
- Lurz, R. (ed.) (2009) *The Philosophy of Animal Minds*, Cambridge, UK: Cambridge University Press.
(A collection of essays by fourteen philosophers of mind/cognitive sciences on what we can know about animals' mental lives.)
- White, T. I. (2007) *In Defense of Dolphins: The New Moral Frontier*, Malden, MA: Blackwell.
(A highly detailed yet accessible exploration of dolphins' intelligence, social lives, and moral importance.)

Notes

1. For recent examples of scholars who embrace this criterion, see Hyun (2013: 145) and Tye (2017: 42–43).
2. On a biographical note, I was three when I first grasped what people meant when they asked me how old I was. Before that moment, which I remember clearly, I had answered "How old are you?" by supplying the

answer I had heard others provide on my behalf. So, when asked my age I simply repeated, “Three.” “How old were you before that?” I said, “Two,” supplying the answer I remembered had been approved earlier. But when my older sister said I had been one year old before I was two, at first I denied this because I had no memory of this being the correct answer. Then I realized that I must have been one because I understood, finally, that these numbers measured amounts of time in my life. Whether this realization was sufficient for having a narrative identity I am not sure, but it was at least a significant step in the direction of such self-awareness.

3. I use the term *creature* to exclude artificial-intelligence systems, which may possess linguistic capacities while lacking consciousness and self-awareness.
4. By contrast, some mental states, such as beliefs and desires, have a dispositional character and are only conscious when brought to awareness.
5. The qualification “ordinarily” leaves room for some exceptions, such as when one is in such a “flow” experience that one temporarily loses aspects of self-awareness.
6. This point applies only to social species whose members are conscious. There is a sense in which ants and bees are highly social, but if they are not conscious, then they lack awareness in general and therefore lack social self-awareness.
7. This may also be true of orangutans but I am uncertain in the case of this semisolitary ape species.
8. In a similar vein, Godfrey-Smith (2016: 93) argues that pain, thirst, oxygen hunger, and the like do not necessitate having an internal model of the world with oneself in it.
9. This is achieved, in part, through “perceptual constancies,” which Godfrey-Smith (2016: 99) helpfully explains in this way: “These are abilities an animal has to re-identify objects despite changes in viewing conditions—distance, lighting, and so on. The animal must factor out the contribution of its own location and perspective to identify the object itself. . . . Perceptual constancies show that an animal is perceiving external objects as external objects—as objects that can stay the same while the animal’s vantage point changes.”

References

- Allen, C. (2013) “Fish cognition and consciousness,” *Journal of Agricultural and Environmental Ethics* 26: 25–39.
- Andrews, K. (2015) *The Animal Mind*, Oxford: Routledge.
- Babb, S., and Crystal, J. (2005) “Discrimination of what, when, and where: Implications for episodic-like memory in rats,” *Learning and Motivation* 36: 177–189.
- Barron, A., and Klein, C. (2016) “What insects can tell us about the origins of consciousness,” *PNAS* 113: 4900–4908.
- Bermudez, J. (1998) *The Paradox of Self-Consciousness*, Cambridge, MA: MIT Press.
- Cabanac, M., Cabanac, A., and Parent, A. (2009) “The emergence of consciousness in phylogeny,” *Behavioural Brain Research* 198: 267–272.
- Call, J. (2010) “Do apes know that they could be wrong?” *Animal Cognition* 13: 689–700.
- Cheney, D., and Seyfarth, R. (1990) *How Monkeys See the World*, Chicago: University of Chicago Press.
- Connor, R., Smolker, R., and Richards, A. (1992) “Dolphin alliances and coalitions,” in A. Harcourt and F. de Waal (eds.) *Coalitions and Alliances in Humans and Other Animals*, Oxford: Oxford University Press.
- Crystal, J., and Foote, A. (2009) “Metacognition in animals,” *Comparative Cognition and Behavior Reviews* 4: 1–16.
- de Kort, S. R., Dickinson, A., and Clayton, N. S. (2005) “Retrospective cognition by food-caching western scrub-jays,” *Learning and Motivation* 36(2): 159–176.
- de Waal, F. (1997) *Bonobo*, Berkeley, CA: University of California Press.
- de Waal, F. (2000) *Chimpanzee Politics*, Baltimore, MD: Johns Hopkins University Press.
- DeGrazia, D. (1996) *Taking Animals Seriously: Mental Life and Moral Status*, Cambridge: Cambridge University Press.
- DeGrazia, D. (2009) “Self-awareness in animals,” in R. Lurz (ed.) *The Philosophy of Animal Minds*, New York: Cambridge University Press.
- Feeney, M., Roberts, W., and Sherry, D. (2011) “Black-capped chickadees (*Poecile atricapillus*) anticipate future outcomes of foraging choices,” *Journal of Experimental Psychology* 37: 30–40.
- Gallup, G. (1970) “Chimpanzees: Self-recognition,” *Science* 167, January: 86–87.
- Gallup, G. (1977) “Self-recognition in primates: A comparative approach to the bidirectional properties of consciousness,” *American Psychologist* 32: 330–338.
- Glover, J. (1988) *I: The Philosophy and Psychology of Personal Identity*, London: Penguin.
- Godfrey-Smith, P. (2016) *Other Minds*, New York: Farrar, Straus, and Giroux.
- Goodall, J. (1986) *The Chimpanzees of Gombe*, Cambridge, MA: Harvard University Press.
- Hampton, R. (2001) “Rhesus monkeys know when they remember,” *PNAS* 98: 5359–5362.

- Hampton, R. (2005) "Can rhesus monkeys discriminate between remembering and forgetting?" in H. Terrace and J. Metcalfe (eds.) *The Missing Link in Cognition*, Oxford: Oxford University Press.
- Herman, L. (1991) "What the dolphin knows, or might know, in its natural world," in K. Pryor and K. Norris (eds.) *Dolphin Societies*, Los Angeles: University of California Press.
- Herman, L. (2002) "Exploring the cognitive world of the bottlenosed dolphin," in M. Bekoff, C. Allen, and G. Burghardt (eds.) *The Cognitive Animal*, Cambridge, MA: MIT Press.
- Hyun, I. (2013) *Bioethics and the Future of Stem-Cell Research*, New York: Cambridge University Press.
- Ingel, D. (1973) "Two visual systems in the frog," *Science* 181: 1053–1055.
- Kornell, N., Son, L., and Terrace, H. (2007) "Transfer of metacognitive skills and hint seeking in monkeys," *Psychological Science* 18: 64–71.
- Locke, J. (1694) *An Essay Concerning Human Understanding*, 2nd ed., London.
- Mann, J., Connor, R., Tyack, P., and Whitehead, H. (eds.) (2000) *Cetacean Societies*, Chicago: University of Chicago Press.
- Miles, L. (1993) "Language and the Orang-utan," in P. Cavalieri and P. Singer (eds.) *The Great Ape Project*, New York: St. Martin's.
- Pardis, S., and Cabanac, M. (2004) "Flavor aversion learning induced by lithium chloride in reptiles but not in amphibians," *Behavioural Processes* 67: 11–18.
- Parker, S., Mitchell, R., and Miles, L. (eds.) (1999) *The Mentalities of Gorillas and Orangutans*, Cambridge: Cambridge University Press.
- Patterson, L. (1978) "Linguistic capacities of a lowland gorilla," in F. Peng (ed.) *Sign Language Acquisition in Man and Ape*, Boulder, CO: Westview.
- Patterson, L., and Gordon, W. (1993) "The case for the personhood of gorillas," in P. Cavalieri and P. Singer (eds.) *The Great Ape Project*, New York: St. Martin's.
- PBS (1995) *Monkey in the Mirror* (documentary about primate cognition).
- Phillips, H. (2006) "Metacognition: Known unknowns," *New Scientist*, December: 28–31.
- Pryor, K., and Norris, K. (1991) (eds.) *Dolphin Societies*, Berkeley, CA: University of California Press.
- Raby, C., Alexis, D., Dickinson, A., and Clayton, N. (2007) "Planning for the future by western scrub-jays," *Nature* 445: 919–921.
- Roberts, W. (2012) "Evidence for future cognition in animals," *Learning and Motivation* 43: 169–180.
- Russon, A., Bard, K., and Parker, S. T. (1996) *Reaching into Thought: The Minds of the Great Apes*, Cambridge: Cambridge University Press.
- Savage-Rumbaugh, S. (1986) *Ape Language*, New York: Columbia University Press.
- Savage-Rumbaugh, S., and Brakke, K. (1990) "Animal language: Methodological and interpretive issues," in M. Bekoff and D. Jamieson (eds.) *Interpretation and Explanation in the Study of Animal Behavior*, Vol. 1, Boulder, CO: Westview.
- Schechtman, M. (1996) *The Constitution of Selves*, Ithaca, NY: Cornell University Press.
- Schwartz, B., Hoffman, M., and Evans, S. (2005) "Episodic-like memory in a gorilla: A review and new findings," *Learning and Motivation* 36: 226–244.
- Seyfarth, R., and Cheney, D. (2003) "The Structure of Social Knowledge in Monkeys," in F. de Waal and P. Tyack (eds.) *Animal Social Complexity*, Cambridge, MA: Harvard University Press.
- Smith, J. D., and Schull, J. (1989) "A failure of uncertainty monitoring in the rat" (n.p.); cited in Shields, W., Smith, D., Guttmanova, K., and Washburn, D. (2005) "Confidence judgments by humans and rhesus monkeys," *Journal of General Psychology* 13: 165–186.
- Smith, J. D., Schull, J., Strote, J., McGee, K., Egnor, R., and Erb, L (1995) "The uncertainty response in the bottlenose dolphin (*Tursiops truncatus*)," *Journal of Experimental Philosophy* 124: 391–408.
- Smith, J. D., and Washburn, D. (2005) "Uncertainty monitoring and metacognition by animals," *Current Directions in Psychological Science* 14: 19–24.
- Stanford, C. (2001) *Significant Others: The Ape-Human Continuum and the Quest for Human Nature*, New York: Basic.
- Stanford, C. (2008) *Apes of the Impenetrable Forest: The Behavioral Ecology of Sympatric Chimpanzees and Gorillas*, London: Pearson.
- Tye, M. (2017) *Tense Bees and Shell-Shocked Crabs: Are Animals Conscious?* New York: Oxford University Press.
- White, T. I. (2007) *In Defense of Dolphins: The New Moral Frontier*, Malden, MA: Blackwell.
- Wittemyer, G., and Getz, W. (2007) "Hierarchical dominance structure and social organization in African elephants, *Loxodonta africana*," *Animal Behaviour* 73: 671–681.