ANIMAL CONSCIOUSNESS IN COGNITIVE ETHOLOGY

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COGNITIVE ETHOLOGY

In the second half of the 20th century non human animal behavior started to be studied in cognitive terms. Comparative psychologists and ethologists studied perception, learning, categorization, memory, spatial cognition, numerosity, communication, language, social cognition, theory of mind, causal reasoning, and metacognition in non human animals. Cognitive ethology arose. I will introduce this concept, its methodology, and its areas of study, as Colin Allen and Mark Bekoff explain[1].

Cognitive ethology is the comparative, evolutionary, and ecological study of animal thought processes, beliefs, rationality, information processing, and consciousness. Its roots are in biologists like Charles Darwin, an anecdotal cognitivist, and some of his contemporaries and disciples. They had interest in evolutionary theory, mental continuity, individual and intra-specific variation, the mental worlds of animals, natural history, and attempts to field studies, in the conditions and environment in which natural selection has occurred or is occurring. Cognitive ethologists, as well, prefer field studies of animal cognition.

Cognitive ethology is highly influenced by philosophy. Typically, philosophers of mind have developed their theories anthropocentrically and have applied those theories only secondarily to questions about animal mentality. Cognitive ethologists, however, study and compare nonhuman mentality and human mentality, with a consideration of the evolution and biological continuity between them. A basic assumption is that some organisms, humans included, have **mental states**.

Cognitive ethology is **interdisciplinary** and favors pluralism, it is influenced by ethology, comparative and cognitive psychology, and philosophy. The questions being asked (and perhaps the animals being studied) drive the selection of the type of description (and other methods) that should

[1] Colin Allen and Mark Bekoff, *Species of Mind. The Philosophy and Biology of Cognitive Ethology*, MIT Press paperback edition, 1999

be used. The explanatory constructs provided by the application of cognitive science to ethology are conceptually richer than Lorenzian constructs such as “action-specific energy” and “drive”. Cognitive ethologists do not study learning and memory alone. They are concerned with the diverse solutions that living organisms have found to common problems, and they attempt to sustain a viable, empirical research program to concepts such as belief and consciousness. In cognitive ethology, **intentionality** is an important concept, they make a difference between actions and other movements. In other words, between what an animal does and what happens to it. They use detailed descriptive information about subtle behaviour patterns and neuroethological data, they consider behavioral evidence necessary for the interpretation of anatomical or physiological data in assessments of cognitive abilities.

Cognitive ethologists emphasize broad taxonomic comparisons, they do not focus on a few select representatives of a limited number of taxa. And they consider important to avoid generalizations at the level of “non-human animals” or at species level of explanation, to take individual differences seriously. They claim that generalizations can be misleading and that they are often based on studies of a very few individuals or on small data sets. **It is important to know about the sensory world of the animals whose behavior one is studying.** For example, which stimulus can motivate an animal? Sensory ecology is useful here, that is, the study of the relationships between normal ecological conditions and differences between the capabilities of animals to acquire, process, and respond to information. Allen and Bekoff propose naturalizing the methods of study by taking the animals' points of view, in other words, communicating with them on their terms.

Among the topics in which cognitive ethology is interested, there is bee communication; studies of language in primates, cetaceans, and psittacines; tool use; food caching and recovery; teaching; imitation; and self-recognition. About ape language and studies in which mirrors have been used to study self-recognition, Allen and Bekoff prefer waiting to future research in wild animals instead of in captives.

They chose to focus on social play and on antipredatory (vigilance) behavior because there are many points of contact with philosophical discussions of intentionality and representation. Second they want to discuss areas in which there is a good database but one that needs to be filled out by additional comparative field studies. They claim that many studies have been conducted using simplistic and misleading presuppositions, they want to compare different sorts of explanations (e.g., those that appeal to intentionality and representation versus those that appeal to stimulus-response contingencies). They argue that previous explanations are cumbersome and do not seem to account for the data and the flexibility in animals' behavior as well or as simply as explanations that appeal to cognitive capacities of the animals under study.

Allen and Bekoff study social play behavior especially in canids. They claim that play requires to communicate intention. So it involves abilities like communication, intention, role playing, turn taking, and cooperation. It is interesting how individuals communicate that they want to play with others, rather than to eat, fight, or mate with them.

Antipredatory behavior is appropriated to be studied by cognitive ethology because it is amenable to neurobiological studies. Many vertebrates and invertebrates show minute-by-minute, daily, and seasonal changes in their vigilance behavior. It has been observed that, in some birds, that, the bigger a flock is the more time spends each of the members feeding and less time watching. So these birds might have expectations about the behavior of other flock members, in other words, they might expect that other birds in the flock watch for predator's attacks, and, if necessary, warn the others.

Much of the **criticism** of cognitive ethology comes from authors who have strong and radical behavioristic leanings. But Allen and Bekoff point out some faults of mechanistic approaches to the study of animal cognition. Kamil (1987), a comparative psychologist himself, faults many of his colleagues for disregarding external validity (i.e., how relevant a study is to the

natural existence of the animals under study) and for paying too much attention to internal validity (i.e., the logical structure of the experiments being performed).

Allen and Bekoff introduce the notions of stimulus-bound behaviors. That is, behavior patterns that occur almost invariably in response to some stimulus, with external stimuli predominating over internal factors, and stimulus-free behaviors where internal factors predominate over external stimuli. There are different ways of conceiving these internal factors, ranging from interoceptive phenomena to representational accounts of mental states. When the full complexity of the behaviors is considered, behavioristic explanations can seem rather less straightforward than cognitive or mentalistic ones.

Specifically, there are considered serious criticisms of the notion of belief. Allen and Bekoff argue that intentional explanations can be used to explain this notion. Moreover, they respond to those who throw doubt on their attribution of this and other mental states to non-human animals by two ways. On one hand, they claim that a satisfactory definition is an endpoint of scientific investigation, and does not have to be a starting point. For example, early chemists could not have defined gold correctly. They started with putative examples of gold. These examples were initially identified according to a "working definition" that made use of their appearance as a soft, yellow, metallic substance. Investigations revealed a common atomic structure for many of the samples identified in this way. Only after extensive comparative work could chemists define gold in terms of its position in the periodic table of the elements. So cognitive ethologists, as well, make extensive comparative and exhaustive work, in order to finally define concepts like belief or intention.

On the other hand, Allen and Bekoff claim that the fact that the conceptual schemes of nonhuman animals do not exactly correspond to classifications that are of anthropocentric interest does not mean that more precise specification of content is impossible for the cognitive states of animals. I may add that many philosophers maintain a debate about how to explain animal behavior or mind in non antropocentric way. Knowing the mind of other is difficult, even if he belongs at the

same species. And talking about the mind of a member of other species is even harder, because easily anthropocentric assumptions are made.

Cognitive ethologists have been accused of explaining the behavior of non-human animals by human notions. But some mechanistic ethologists could be accused of reducing animal behavior to external, visible patterns, and of ignoring richer explanations, when many mental, non visible, notions are accepted in humans, such as emotions, intention, beliefs or consciousness. Cognitive ethologists make comparative studies in anatomic structures of many animals, and they study different kinds of individuals, having in count their sensory world. It may be a good approach to avoid anthropocentric or other kind of prejudices. And it can help learning about notions like consciousness.

NON HUMAN CONSCIOUSNESS

Consciousness is still a controversial notion in ethology, and some authors have used this argument to deny the moral status of non human animals, so I will focus on this concept, explained by cognitive ethologist Collin Allen.

Following his entry of the Stanford Encyclopedia of Philosophy[2], I will expose five main senses of consciousness, different views about animal minds, and arguments against and for animal consciousness.

In the first sense, to be conscious means being awake rather than asleep. **In the second sense, consciousness is related to the ability to perceive, be aware of and thereby respond to selected features of their environment**. The Stanford Encyclopedia refers to Jennifer A. Mather's paper about cephalopod consciousness (2008) to claim that consciousness in both previous senses can be identified in a wide variety of organisms.

Ned Block enunciated the concept of access consciousness in 1995, referring to mental representations that may be poised for use in rational control of action and higher cognitive processes such as categorization, reasoning, planning, and voluntary direction of attention. Block believes that many animals possess access consciousness (speech is not a requirement). Indeed, some of the neurological evidence cited by Block (2005) in support of the global workspace is derived from monkeys. But Descartes or Davidson (1975) would deny this kind of consciousness to them.

The fourth sense is the phenomenal consciousness, which refers to the qualitative, subjective, experiential, or phenomenological aspects of conscious experience, sometimes identified with qualia, that is, introspectively accessible, phenomenal aspects of our mental lives. It is called "sentience" too. Thomas Nagel, in his work "What is It Like to Be a Bat?" (1975)

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[2] Allen, Colin, "Animal Consciousness", The Stanford Encyclopedia of Philosophy (Summer 2011 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/sum2011/entries/consciousness-animal/>, summer 2011

claims that we cannot know, imagine, or describe in scientific terms what it is like to be a bat, but he assumes that there might be "something it is like" to be a member of another species. Most scientists and philosophers believe that phenomenal consciousness might be in mammals, birds and perhaps some cephalopods, but they do not agree about reptiles, amphibians, fish or invertebrates.

Other kind of consciousness is the self-consciousness. It is the capacity of being aware of the own mental states, that is, a second-order representation of those mental states, and it is closely related to questions about "theory of mind". Usually self-consciousness is accepted as empirically tractable.

Two questions are fundamental about animal consciousness. The first one is the distribution question, that is: Can we know which animals beside humans are conscious? The second one is the phenomenological question, that is: Can we know what, if anything, the experiences of other animals are like? There is a fundamental skeptical problem about knowledge of other minds, about how we can know that there are other beings that are consciously aware of anything. In fact, in the case of non human animals, there are special difficulties, because we cannot interrogate them about their experiences as we do with humans. But, **as Tom Regan writes[3], the assumption that human beings are creatures who have a mental life is a necessary assumption for any work in moral philosophy**. So I will try to find evidences that it is possible to do ethics toward non human animals.

There are many theories that guide the different studies about animal mind. **Dualists** hold that consciousness is not reducible to physical mechanisms, at least to any known physical principles. So, Allen argues in the Stanford Encyclopedia, they may rely upon behavioral criteria for deciding which animals have consciousness. Some, as Dennett (1969, 1995, 1997) or Carruthers (1996), deny that animals are conscious in anything like the same sense that humans are, because they do not have human language, which they think is indispensable to human consciousness.

Physicalists, otherwise, identify consciousness with unspecified physical or physiological

[3] Regan, Tom, *The Case for Animal Rights*, University of California Press, California, 2004, p. 17

properties of neurons. They try to relate phenomenal consciousness to some general property such as quantum coherence in the microtubules of neurons, or brain waves of a specific frequency. **Block** argues, based on research in humans and monkeys, that recurrent feedback activity in sensory cortex is possibly the neural correlate of phenomenal consciousness, characterized in a functional way. **Prinz** (2005) identifies phenomenal consciousness with brain processes that are involved in attention to intermediate-level perceptual representations which feed into working memory via higher level, perspective-invariant representations. Those processes have been observed in mammals, such as other primates and rats, but Prinz claims that we have no evidence in other species, like octopus, pigeons, bees, and slugs.

Representationalists relate phenomenal consciousness to the representational content of mental states, subject to some further functional criteria. **First-order representationalists** hold that if a particular state of the visual system, which is part of the sensory system of an organism, represents (not conceptually mediated) some property of the world in a functionally appropriate way, then the organism is said to be phenomenally conscious of that property. On Dretske's (1995) view, phenomenal consciousness is therefore very widespread in the animal kingdom. Tye (2000) argues that it extends even to honeybees.

Other authors characterize phenomenal consciousness as **higher-order representation**, that is, mental states directed towards other mental states. Carruthers (1998a,b, 2000) holds the **higher-order thought** theory, that is, that a mental state is phenomenally conscious for a subject just in case it is available to be thought about directly by that subject (he says "available", that is, it needs not to be actually thought about). And that a creature needs a theory of mind and concepts for thought about that mental state. Carruthers has used this theory to deny phenomenal consciousness to (almost) all nonhuman animals. Genaro (2004) argues, however, that a higher order thought theory is compatible with consciousness in nonhuman animals.

On the other hand, Armstrong (1980) and Lycan (1996) maintain **higher-order experience** theories, that is, if a creature has inner perception of his mental states (there is no need of concepts), that creature is conscious of those mental states. This view can be traced back to Aristotle, and also

to John Locke. Higher-order experience theories are inclined to admit that consciousness may be found in other animals.

Even so, Allen reminds us that consciousness is just one feature of mental states. Many behavioral scientists accept cognitivist explanations of animal behavior that attribute representational states to their subjects, such as intentionality, yet they remain hesitant to attribute consciousness. Allen points out that, as in the early stages of the scientific investigation of any phenomenon, perhaps the study of animal consciousness would benefit from the study of some animal characteristics, even if we do know if all these examples will involve conscious experience.

Allen shows some **arguments that are maintained against non-human animal consciousness**. Cartesians point out the limitations shown by animals in studies on the acquisition of a degree of linguistic competence by chimpanzees, bonobos (Gardner *et al*. 1989; Savage-Rumbaugh 1996) and a parrot (Pepperberg 1999). By these limitations they try to show that **other animals lack of some human abilities, like language**, which they consider important in phenomenal consciousness. Tom Regan[4] wonders then if they consider that mentally enfeebled humans who lack the potential for language acquisition, but seem to be conscious for some things, for instance, sounds and pains, are actually not conscious.

A different kind of strategy that has been used to deny animal consciousness is to focus on certain **similarities between other animal behaviors and behaviors which may be conducted unconsciously by humans**. Carruthers (1989, 1992) argued that all animal behavior can be assimilated to the non-conscious activities of humans, such as driving while distracted ("on autopilot") or to the capacities of "blindsight" patients whose damage to visual cortex leaves them phenomenologically blind in a portion of their visual fields (a "scotoma") but nonetheless able to identify things presented to the scotoma. (He refers to both of these as examples of "unconscious experiences".) Allen responds that careful investigation could reveal that, for example, non-human animals are able to recall their experiences, whereas the unconscious experiences of automatic driving are not remembered by their subjects. Jamieson & Bekoff (1992) note that blindsight

[4] Regan, Tom, *The Case for Animal Rights*, University of California Press, California, 2004, p. 16

subjects must be trained to make responses to things presented to their scotomas using a forced-response paradigm, while it seems that other animals respond spontaneously to their visual stimulus.

Arguments from the **absence of self-consciousnes**s are given too, like Carruthers does by his higher-order thought theory, described above. Gordon Gallup *et al.* (2002) maintain that having a theory of mind, that is, the attribution of mental states to others, is a byproduct of being self-aware. Gallup (1970) had developed an experiment on mirror self-recognition and argues the performance of chimpanzees in this test indicates that they are self-aware, on the contrary to Carruther's conclusions. Carruthers is based on studies by Povinelli (1996), whose interpretation remains controversial. Hare et al. (2000) conducted experiments on chimpanzees as well, and concluded that "at least in some situations chimpanzees know what conspecifics do and do not see and, furthermore, that they use this knowledge to formulate their behavioral strategies in food competition situations." They suggest that Povinelli's negative results may be due to the fact that his experiments involve less natural chimp-human interactions.

Methodological problems too have been pointed out to deny animal consciousness. Behaviorists only accept observable terms or terms that could be formally defined in terms of observables, or otherwise operationalized experimentally. Allen argues that some psychologists and ethologists do not take in count intentionality in **Brentano**'s (1995) sense, that is,

> "Every mental phenomenon is characterized by what the Scholastics of the Middle Ages called the intentional (or mental) inexistence of an object, and what we might call, though not wholly unambiguously, reference to a content, direction towards an object (which is not to be understood here as meaning a thing), or immanent objectivity. Every mental phenomenon includes something as object within itself, although they do not all do so in the same way. In presentation something is presented, in judgment something is affirmed or denied, in love loved, in hate hated, in desire desired and so on. This intentional in-existence is characteristic exclusively of mental phenomena. No physical phenomenon exhibits anything like it. **We could, therefore, define mental phenomena by saying that they are those phenomena which**

contain an object intentionally within themselves."

Allen concludes that denying consciousness to non-human animals because we assume that consciousness is private or subjective, so we cannot know what it is like to be a bat (Nagel 1974), implies the assumption that consciousness has absolutely no measurable effects on behavior.

On the other hand, Allen explains some **arguments for non-human animal consciousness**. Common sense observations point to **similarities between the behavior of nearby animals and human behavior**. The reactions of many animals, particularly other mammals, to bodily events that humans would report as painful are easily and automatically recognized by most people as pain responses. High-pitched vocalizations, fear responses, nursing of injuries, and learned avoidance are among the responses to noxious stimuli that are all part of the common mammalian heritage. Similar responses are also visible to some degree or other in organisms from other taxonomic groups.

These arguments are very close to considerations of **evolutionary continuity (homology) between species**. The creator of cognitive ethology, Donald R. Griffin[5], supports the view that consciousness has a survival value: "The better an animal understands its physical, biological, and social environment, the better it can adjust its behavior to accomplish whatever goals may be important in its life". In fact, Allen writes, humans share a similar nervous system with other vertebrates, specifically all mammals share the same basic brain anatomy. He explains that much of the research that is of direct relevance to the treatment of human pain, including on the efficacy of analgesics and anesthetics, is conducted on rats and other animals, based on the similarity of the mechanisms involved. Monkeys are used in studies about blindness and neuropsychiatric disorders, which presupposes convergence of emotional and other conscious states (Stoerig & Cowey 1997, Sufka *et al*. 2009).

[5] Griffin, Donald R., *The Question of Animal Awareness: Evolutionary Continuity of Mental Experience*, The Rockefeller University Press, New York, 1976, p. 85

As Oscar Horta[6] points out, even most invertebrates have a central nervous system. He mentions works from Smith (1991), Chandroo *et al*. (2004) and Sneddon (2004). In his notes, Allen says that the existence of nociceptors seems to be well established in marine molluscs (Walters in Willis (ed.) 1992). So, as Tom Regan[7] claims, if we admit that humans have consciousness, the application of the principle of parsimony to the evolutionary process supports the view that other animals are conscious too.

However, as we explained above, similarity arguments are open to critics to exploit abilities that humans have and other animals seem not to have. There is no inconsistency with evolutionary continuity to maintain that only humans have some capacities. Some argue that superficial observation of quite similar behaviors even in closely related species does not guarantee that the underlying cognitive principles are the same (Povinelli & Giambrone 2000, Povinelli 1996). Allen proposes a combination of behavioral, physiological and morphological similarities with evolutionary theory.

So he looks for a theoretical basis for connecting the observable characteristics of animals (behavioral or neurological) to consciousness. He thinks that it can be on the **biological function or functions of consciousness**, and he proposes assuming that phenomenal consciousness is a characteristic that has evolved by natural selection. That would deny epiphenomenalism, that is, that mental events have no effects upon any physical events.

Allen explains Griffin's suggestion that consciousness might have the function of compensating for limited neural machinery (Griffin 1976, 1984, 1992). But many authors criticize this suggestion, as well as Griffin's connection between his examples of intelligence in non-human animals and the attribution of consciousness (Alcock 1992, Bekoff & Allen 1997, Allen & Bekoff

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6 Horta, Oscar, *Tomándonos en serio la consideración moral de los animales*, in Rodríguez Carreño, Jimena (ed.), *Animales no humanos entre animales humanos*, Plaza y Valdés, Madrid, 2012, pp. 191-226.

7 Regan, Tom, *The Case for Animal Rights*, University of California Press, California, 2004, pp. 19-20

1997). Allen claims that by Griffin's suggestion, we may think that consciousness is more important to honey bees than to humans.

Another possible function of consciousness would be that consciousness "tells" the organism about events in the environment, or, in the case of pain and other proprioceptive sensations, about the state of the body. But this answer begs the question against opponents of attributing conscious states to animals for it fails to respect the distinction between phenomenal consciousness or sentience and mere awareness (in the uncontroversial sense of detection) of environmental or bodily events.

Allen & Bekoff (1997) find interesting investigating the capacities of animals to adjust to their own perceptual errors. They claim that in cases where an organism can adjust to a perceptual error while retaining the capacity to exploit the content of the erroneous perception, then there may be a robust sense in which the animal internally distinguishes its own appearance states from other judgments about the world. It would support the existence of consciousness in a higher-order representation sense, or at least in a higher-order experience sense, sense in the animal. In human case, Allen explains, they have conscious visual experiences that they know are misleading — i.e., visual illusions — yet they can exploit the erroneous content of these experiences for various purposes, such as deceiving others or answering questions about how things *appear* to them.

Carruthers (2000) makes a similar suggestion about the function of consciousness, relating it to the general capacity for making an appearance-reality distinction, but, as it explained above, he maintains that this capacity depends upon having conceptual resources that are beyond the grasp of nonhuman animals.

Finally, Allen explains **interpretivism**, that is, the vision that the attribution of consciousness is not a matter of drawing an inference at all, but a response more akin to interpretation. As Searle (1998) puts it,

> "I do not infer that my dog is conscious, any more than, when I came into this room, I inferred that the people present are conscious. I simply respond to them as is appropriate to conscious beings"

He mentions also works of other philosophers (Dennett 1987, Jamieson 1998, or Wittgensteinian author Gaita 2003), and cognitive ethologists (Allen 2004a). Interpretivism seems not able to compete with scientific epistemology, but talking about consciousness without defining it scientifically may be useful to the study of animal behavior or minds. An interesting question is, is it necessary to have strong scientific grounds for animal consciousness, to maintain that non-human animals deserve moral consideration?

ETHICAL CONSEQUENCES

As I mentioned above, in the debate about moral responsibility toward non-human animals, questions about their mental states arise. Utilitarianism, the position maintained by Jeremy Bentham or Peter Singer, maintains that we must get the most interests satisfied, independently of whose interests are. Peter Singer[8] claims that the relevant characteristic of a being to deserve moral respect is, then, having interests. And that a being that is capable of suffering pain or enjoying pleasure, has interest in avoiding pain and in enjoying pleasure. In the same way, Jeremy Bentham avoided the debates about other animal's abilities like intelligence or language in relation to moral deserve, by his famous sentence[9]:

"The question is not "Can they reason?" nor "Can they talk?" but "Can they suffer?""

This vision is a strong ground for ethics toward non-human animals, because pain is recognized in many animals. As Allen[10] explains, Smith & Boyd (1991) assess the evidence for the pain-sensing capabilities of animals in the categories of whether nociceptors are connected to the central nervous system, whether endogenous opioids are present, whether analgesics affect responses, and whether the ensuing behavioral responses are analogous to those of humans. On the basis of these criteria, Varner follows Smith & Boyd in concluding tentatively that the most obvious place to draw a line between pain-conscious organisms and those not capable of feeling pain consciously is between vertebrates and invertebrates. However, Elwood & Appel (2009) conducted an experiment on hermit crabs which they interpret as providing evidence that pain is experienced and remembered by these crustaceans.

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8 Singer, Peter, *Animal Liberation*, Harper College Publisher, New York, 1999

9 Bentham, Jeremy, *Introduction to the Principles of Moral and Legislation*, 1823

10 Allen, Colin, "Animal Consciousness", The Stanford Encyclopedia of Philosophy (Summer 2011 Edition), Edward N. Zalta (ed.), URL = <http://plato.stanford.edu/archives/sum2011/entries/consciousness-animal/>, summer 2011

Peter Carruthers[11] deny moral status of animals because, as we have seen, he believes that only humans have consciousness in the sense of second order thoughts. But Carruthers defends contractualist ethics - other ethic views toward non-human animals, like utilitarianism, can be maintained even having in count his arguments against this concept of consciousness. Anyway, studies that suggest moral abilities in non-human animals, like the research made by the primatologist Frans the Waal[12], can be considered to construct a contractualist theory that has other animals in count.

Kant, as well, denied moral status of other animals. But his theory about ethics, based in moral subject's freedom, could be reviewed having in count studies about intentionality in many animals. Another way of understanding freedom could be relating ethic considerations to consciousness in the sense of second order representation, if we consider that conscious beings can manage their desires.

[11] Carruthers, Peter, *The Animals Issue*, Cambridge University Press, Cambridge, 1994
[12] De Waal, Frans, *Good Natured*, Harvard University Press, Cambridge, 1996