

## THE MORAL CONSIDERATION OF NONHUMAN ANIMALS: HOW CAN WE IDENTIFY WHICH BEINGS ARE CONSCIOUS?<sup>1</sup>

WALTER SÁNCHEZ SUÁREZ

*Universidade de Santiago de Compostela*

### RESUMEN

Desde diversas posiciones éticas se sostiene que la capacidad de un individuo para darse cuenta, en mayor o menor medida, de aquello que le sucede es el elemento necesario y excluyente para que merezca consideración moral *per se*. Sin embargo, a día de hoy se carece de un método directo para identificar la capacidad de un individuo para ser consciente, y, por tanto, para corroborar así la creencia de que ciertos seres —entre los cuales se encuentra un gran número de animales no humanos— son conscientes. A lo largo de este artículo analizaré la problemática relativa a esta cuestión, así como las diferentes herramientas científicas de que disponemos para construir hipótesis acerca de la probabilidad de que un individuo sea consciente. Como se verá, en la actualidad es posible concluir que muy probablemente un gran número de animales no humanos son seres conscientes, y que en base a esto merecen consideración moral.

**Términos clave:** animales no humanos, consideración moral, consciencia, cognición, comportamiento, neurociencia.

### ABSTRACT

A variety of ethical positions consider that the ability of an individual to be aware of what befalls him or her—in a more or less complex manner—is the indispensable attribute for that being to be *per se* morally considered. Nowadays, nevertheless, we lack a direct method to identify the ability of an individual to be conscious and, therefore, to corroborate the belief that certain beings—many nonhuman animals included—are conscious. Throughout this article I will analyze the questions related to this issue, and in particular the different scientific tools that we have in order to construct hypothesis about the probability of individuals of being conscious. As we shall see, at present we can come to the conclusion that a

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great number of nonhuman animals are probably conscious and that, therefore, they deserve to be morally considered.

**Keywords:** nonhuman animals, moral consideration, consciousness, behaviour, neuroscience.

## 1. INTRODUCTION: WHICH BEINGS DESERVE PER SE MORAL CONSIDERATION?

From the 1970's onwards, the issue of the moral consideration of the nonhuman animals has received increasing attention. In this context, many of the current ethical theories consider being conscious as the deciding attribute for deserving moral consideration. For instance, Classic and Preference Utilitarianism, and those theories which defend moral rights for nonhuman animals. Similarly, Contractarian approaches such as the one proposed by Mark Rowlands, the kind of Egalitarianism defended by Ingmar Persson, Prioritarian positions such as the one defended by Nils Holtug, and certain sufficientarian approaches as the one set out by Roger Crisp consider being conscious the deciding attribute for deserving moral consideration.<sup>2</sup>

On the other hand, according to common sense it is believed that consciousness is not an exclusive ability of some humans.<sup>3</sup> If this is so, individuals of other species deserve moral consideration. However, we still treat a huge number of nonhuman animals that we believe are conscious<sup>4</sup> in ways that, in the case of conscious beings, often imply deprivation of

2 Horta, Oscar, "El cuestionamiento del antropocentrismo: distintos enfoques normativos", *Revista de Bioética y Derecho*, 16, 2009, 36–39. In this article Oscar Horta reviews the different ethical positions from which it is considered that the sphere of moral consideration spreads beyond human species.

3 See Rollin, Bernard E., *The Unheeded Cry: Animal Consciousness, Animal Pain, and Science*, New York: Oxford University Press, 1989.

4 FAO estimates the following data for some of the most frequently exploited mammal and bird species (number of animals per species used in 2008):

Cattle – 1,347,473,112

Sheep – 1,078,178,799

Goats – 861,901,978

Pigs – 941,281,626

Chickens – 18,398,436,000

Geese and Guineafowls – 351,373,000

Turkeys – 482,425,000

Data from FAOSTAT website, see: FAO (Food and Agriculture Organization of the United Nations), "Live Animals", *FAO Statistical Database*, 2010,

<http://faostat.fao.org/DesktopDefault.aspx?PageID=573&lang=en#ancor> [ref. July 10, 2010].

In the case of fish, FAO estimates that 77,830,376 tons of fish were captured in continental and oceanic waters during 2006. Besides, FAO also report that during the same year 53,653,329 tons of fish, crustaceans and molluscs came from aquaculture. Data from FAO Fisheries and Aquaculture Department website: FAO (Food and

satisfying their needs and therefore morally unjustifiable physical and psychological suffering. This is mainly the case of activities related to the nonhuman animal exploitation industry, fishing, hunting, and often to that kind of scientific research that harms nonhuman animals. In order to understand this situation it is important to consider that human cultures have been exploiting nonhuman animals since distant times. In this context, whether because of ignorance of the relevant ethical arguments of this issue, religious reasons, or just a matter of selfishness, most humans still use nonhuman animals for their own purposes without considering these beings interests. Paradoxically, it is generally agreed that it is bad to harm somebody that can suffer.<sup>5</sup> Yet, it is remarkable that in these last decades concern about animal welfare has increased,<sup>6</sup> as well as the number of vegetarians and vegans.<sup>7</sup> According to these facts, a change in the way that we interact with those nonhuman animals considered conscious seems possible.

Nevertheless, despite the fact that the ethical foundations for this change are laid, the issue of whether humans have the ability to distinguish which beings are conscious is still a matter of controversy. In this situation, and given that many of the contemporary societies base their knowledge on scientific grounds, it seems necessary to scientifically demonstrate that the ability of being conscious is spread beyond the *Homo sapiens* species: whereas we are not able to confirm that this huge number of nonhuman animals that we regard as conscious are actually conscious, the approaches that defend that these beings deserve moral consideration shall be vulnerable to those arguments that maintain that it is not possible to scientifically demonstrate that these are conscious beings.

## 2. THE IDENTIFICATION OF CONSCIOUS BEINGS

Beyond what common sense tells us about this matter, current scientific knowledge is not able to provide us with conclusive answers to

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Agriculture Organization of the United Nations), "FAO yearbook. Fishery and Aquaculture Statistics. 2006", *Fishery Statistics Programme*, 2010, <http://www.fao.org/fishery/statistics/programme/publications/all/en> [ref. July 10, 2010].

5 As seen above, the largest number of animals used for human purposes are mammals and fish. It is paradoxical that many of these activities that we know cause suffering to conscious beings involve animals that we believe conscious.

6 This is particularly noticeable in the legislation regarding animal well being, where the animal welfare regulations are being reinforced. Regardless, it is relevant to point out that these welfare orientated laws belong to an anthropocentric system in which nonhuman animals are considered as resources that humans can exploit, without taking into account the current considerations on the moral status of these animals.

7 It is important to underline that only a way of living based on the consumption of products that come from non conscious beings will be effective to put an end to the suffering of nonhuman animals due to human exploitation.

the question of which beings are conscious. Nowadays we understand that consciousness, in general, has to do with the ability of being aware of, at least, part of what befalls to us; but beyond the personal experience that enable us to realize that we are conscious, at present we lack direct methods for identifying the possession of this ability, not even in the case of those beings capable of any type of human language. In the case of most nonhuman animals, —as well as in the case of those humans incapable of human languages—, the inability to directly communicate means that there is a greater reliance on other kinds of information to try to understand whether they are conscious beings.<sup>8</sup> This juncture implies that scientists are often too cautious when dealing with questions related to the issue of consciousness.<sup>9</sup> Yet, experimental sciences often have to deal with intangible and non-directly measurable phenomena which are not regarded as unapproachable because of this reason, thus these determining factors should not prevent us from continuing researching into this issue.<sup>10</sup> In this sense, the fact that at present it is not possible to identify the ability of being conscious through direct scientific methods should not play down the importance of the fact that —as we shall later on see— some current scientific tools enable us to infer which beings are probably conscious; these are also useful tools to demonstrate that for many animals it is not possible to determine whether they are conscious or not.

Similarly, the fact that we are prevented from solving the question of phenomenological nature related to the consciousness of the others —is it possible to know how are the experiences of other individuals?— does not imply that it is not possible to make progress in the solution of the question related to the distribution of consciousness in phylogeny —can we identify which beings are conscious?—. In other words, and according to the well-known reflections of Thomas Nagel on the subjective experience of a bat,<sup>11</sup> the fact that we are prevented from knowing what it is like to be a bat

8 See Colin Allen and Mark Bekoff's considerations on "the problem of the mind on the other species". Allen, Collin and Bekoff, Mark, *Species of Mind*, Cambridge: MIT Press, 1997.

9 See Dawkins, Marian S., "Who Needs Consciousness?", *Animal Welfare*, 10, 2001, 19–29. Here Marian Stamp Dawkins discusses the difficulties we face when developing a scientific research into consciousness, considering, as a last resort, the need to keep researching this complex issue.

10 See Flanagan, Owen; *Consciousness Reconsidered*, Cambridge: MIT Press, 1992.

11 See Nagel, Thomas; *Mortal Questions*, Cambridge: Cambridge University Press, 1979. In the chapter 12 of this work, entitled "What Is It Like to Be a Bat", this author reflects on the impossibility of knowing what it is for a bat to be a bat. In this well-known work, Nagel considers that the lack of resources of his own mind for this task is what prevents him from knowing what it is like to be a bat from the perspective of a bat.

from a bat point of view does not mean that we do not have solid grounded arguments for concluding that, probably, many bats are conscious beings.

### 3. BEYOND COMMON SENSE: THE SCIENTIFIC IDENTIFICATION OF THE CONSCIOUS BEINGS

Today we have a set of scientific tools that, together and according to a reductionist approach, enable us to conclude, or at least not to rule out, that a certain being is conscious. According to biological reductionism, the properties, concepts, explanations, or methods from one scientific domain (typically at higher levels of organization) can be deduced from or explained by the properties, concepts, explanations, or methods from another domain of science (typically one about lower levels of organization).<sup>12</sup> In this particular case, the scientific disciplines that contribute with relevant data in order to identify which beings are conscious, are mainly cognitive ethology and neuroscience.

Mark Bekoff, an eminent researcher in the field of cognitive ethology, defines this discipline as the comparative, evolutionary and ecological study of the minds of the animals, in order to understand which animals are able to think and feel. To that end, animals are studied in their natural environment, or under conditions that try to reproduce their natural environment, with the aim of determining whether they are conscious beings.<sup>13</sup> Determining the possession of consciousness relies mainly on the observation and identification of behavioural features; thus, the flexibility that many animals show in their behaviour can often be interpreted by cognitive ethologists as deliberate and appropriate decisions with regard to the different situations that they have to face. These data are analyzed in an evolutionary context, since the features shared by members of close species from a phylogenetic point of view often prove relevant in order to provide these arguments with more solid grounds.<sup>14</sup>

In the context of neurosciences, a series of non-invasive brain imaging techniques<sup>15</sup> are providing us with new data that complement our current

12 See Brigandt, Ingo and Love, Alan, "Reductionism in Biology", *The Stanford Encyclopedia of Philosophy*, 2008, in Zalta, Edward N. (ed.), <http://plato.stanford.edu/archives/fall2008/entries/reduction-biology/> [ref. july 20, 2010].

13 See Bekoff, Mark, *Animal Passions and Bestly Virtues: Reflections on Redecorating Nature*, Philadelphia: Temple University Press, 2006, chapter 2; and Bekoff, Mark, *The Emotional Lives of Animals*, Novato: New World Library, 2007, chapter 2.

14 See Griffin, Donald R., *The Question of Animal Awareness: Evolutionary Continuity of Mental Experience*, New York: Rockefeller University Press, 1976.

15 These techniques are, mainly, Functional Magnetic Resonance Imaging (fMRI), Magnetoencephalography (MEG), Electroencephalography (EEG), Positron emission

neuroanatomical knowledge<sup>16</sup> and enable us to grasp a better understanding of which neural structures and circuits seem to be related to the ability of being conscious.<sup>17</sup> Thus, through these techniques it is being possible to develop comparative analysis between brain structures and circuits that show a higher activity during those events that many humans report as conscious, and those similar events that we regard as conscious in some nonhuman animals and in some humans that are unable of any kind of human language.<sup>18</sup> Although the applicability of these techniques to behavioural experiments is still limited, their future development will possibly enable us to use them in a wider range of behavioural experiments, and to likewise relate with more precision behaviours that we regard as conscious with the changes that take place in the brain during these events.

Cognitive neuroscience deals mainly with the neural bases involved in cognition.<sup>19</sup> Even though cognitive and conscious processes are sometimes

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tomography (PET), Single photon emission computed tomography (SPECT), and Transcranial magnetic stimulation (TMS).

16 See Butler, Ann B., “Evolution of Brains, Cognition, and Consciousness”, *Brain Research Bulletin*, 75, 2008, 442–49.

17 It is considered that the thalamocortical activity –the neural activity that takes place between thalamus and cortical structures– in mammals (see Seth, Anil K.; Baars, Bernard J. and Edelman, David B., “Criteria for Consciousness in Humans and Other Mammals”, *Consciousness and Cognition*, 14, 2003, 119–39.), birds, and reptiles (see Edelman David B.; Baars, Bernard J. and Seth, Anil K., “Identifying Hallmarks of Consciousness in Nonmammalian Species”, *Consciousness and Cognition*, 14, 2005, 169–87; and Butler, Ann B. and Cotterill, Rodney M. J., “Mammalian and Avian Neuroanatomy and the Question of Consciousness in Birds”, *The Biological Bulletin*, 211, 2006, 106–27.), is a relevant neural substrate with regard to the possession of the ability of being conscious in these animals. On the other hand, it is as well suggested that this ability could have arisen even before the development of the cortical structures (see Merker, Bjorn, “Consciousness without a Cerebral Cortex: A Challenge for Neuroscience and Medicine”, *Behavioral and Brain Sciences*, 30, 2007, 63–81). If correct, this hypothesis would add evidence to those arguments that consider that the rest of vertebrates – including amphibians and fish–, even when lacking such an elaborated thalamocortical circuitry, are conscious beings as well (see Aarhem, Peter; Lindahl, B. Ingemar B. and Manger, Paul R., “On the Origin of Consciousness-Some Amniote Scenarios”, in Aarhem, Peter and Liljenström, Hans (eds.), *Consciousness Transitions-Phylogenetic, Ontogenetic and Physiological Aspects*, Amsterdam: Elsevier, 2008, pp. 77–96; Cabanac, Michel; Cabanac, Arnaud J. and Parent, André, “The Emergence of Consciousness in Phylogeny”, *Behavioural Brain Research*, 198, 2009, 267–72; Chandroo, Kristopher P.; Duncan Ian J. H., Moccia, Richard D., “Can Fish Suffer?: Perspectives on Sentience, Pain, Fear and Stress”, *Applied Animal Behaviour Science*, 86, 2004, 225–50; and Sneddon, Lynne U., “The Evidence for Pain in Fish: The Use of Morphine as an Analgesic”, *Applied Animal Behaviour Science*, 83, 2003, 153–62).

18 A good example of this methodology is Seminowicz, David A.; Laferriere, Audrey L.; Millecamps, Magali; Yu, Jon S. C.; Coderre, Terence J. and Bushnell, M. Catherine, “MRI Structural Brain Changes Associated with Sensory and Emotional Function in a Rat Model of Long-Term Neuropathic Pain”, *NeuroImage*, 47, 2009, 1007–14.

19 According to Sara J. Shettleworth, cognition refers to the mechanisms by which animals acquire, process, store and act on information from the environment. See

unassociated processes in humans,<sup>20</sup> it is nowadays considered that consciousness could have arisen during evolution due to the relation of those brain areas that have to do with perception and memory.<sup>21</sup> According to this hypothesis, the study of the cognitive abilities of nonhuman animals is a useful field of research in order to identify conscious cognitive events similar to the ones that humans are able to experience.<sup>22</sup>

Finally, data relating to autonomic nervous system functions which are obtained through the study of conscious events in humans also prove useful when attempting to identify the possession of the ability of being conscious in nonhuman animals.<sup>23</sup> This kind of information (values basically relating to heart rate, blood pressure, hormonal responses, skin temperature and conductance...) are often difficult to interpret, given that different experiences can trigger similar responses from the autonomic nervous system; nevertheless, the similar responses showed by both humans and nonhumans under similar circumstances, once linked to the information obtained with the methods that we have seen above, prove useful in evaluating the probability of an animal of being conscious.

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Shettleworth, Sara J., *Cognition, Evolution, and Behavior*, New York: Oxford University Press, 1998.

- 20 See Butler, Laurie T. and Berry, Dianne C., "Implicit Memory: Intention and Awareness Revisited", *Trends in Cognitive Sciences*, 5, 2001, 192–97.
- 21 See Tononi, Giulio and Edelman, Gerald M., "Consciousness and Complexity", *Science*, 282, 1998, 1846–51; and Baars, Bernard J., "The Conscious Access Hypothesis: Origins and Recent Evidence", *Trends in Cognitive Sciences*, 6, 2002, 47–52.
- 22 Current experiments that put into practice the cognitive bias technique are proving particularly interesting for the question of consciousness and nonhuman animals. In humans, these kinds of experiments enable researchers to foresee the answers of their patients according to their current emotional state. Thus, patients that are experiencing negative states —such as stress, for instance— when facing up a determinate stimulus, show predisposition to interpret it differently from patients that are not experiencing these negative states. According to some researchers, this technique is also useful in order to identify ability of experiencing conscious emotional states in nonhuman animals. See Mendl, Michael and Paul, Elizabeth S., "Consciousness, Emotion and Animal Welfare: Insights from Cognitive Science", *Animal Welfare*, 13, 2004, 17–25; and Burman, Oliver H.; Parker, Richard M.; Paul, Elizabeth S. and Mendl, Michael, "Anxiety-Induced Cognitive Bias in Non-Human Animals", *Physiology and Behavior*, 98, 2009, 345–50.
- 23 A good example of how data concerning autonomic nervous system functions can be useful in identifying the ability of being conscious is Parrv, Lisa A., "Cognitive and Physiological Markers of Emotional Awareness in Chimpanzees (*Pan troglodytes*)", *Animal Cognition*, 4, 2001, 223–29. Here it is possible to understand how information regarding changes in peripheral skin temperature in humans and chimpanzees is relevant in order to identify whether they are conscious beings.

#### 4. COMPOSITE ARGUMENTS

According to Colin Allen's<sup>24</sup> and David DeGrazia's,<sup>25</sup> a composite argument that brings together the set of reasons for which it is considered that a certain being is conscious is probably the most effective way to base the consideration that that being is conscious. Beyond common sense, we have seen that these reasons are founded in the data obtained through the different scientific disciplines that deal with consciousness and the ability of being conscious. Next, I will set out the reasons that make for the argument that this is the most rigorous way that we nowadays have in order to assess the bigger or lesser probability of a certain animal of being conscious.

As we have already seen, reductionist approaches seem the most appropriate in order to base the hypothesis that a being is conscious. Yet, those arguments that, to this aim, are based in analogies obtained through the comparative study of conscious events in humans and similar events in nonhuman animals—similarity or inferential arguments—are still quite weak. These sorts of arguments can be replied by pointing out that the existing differences between human and nonhuman animals prevent us from concluding that many nonhuman animals are conscious.<sup>26</sup> Irrespective of the nature of these arguments (behavioural, neurophysiological, neuroanatomical...), and even when related to evolutionary arguments and to common sense considerations on this matter, the fact that many humans are conscious does not necessarily imply that animals of other species—even when close to humans from a phylogenetical point of view—are conscious beings as well. However, a composite argument that brings together the current multidisciplinary knowledge into this issue is more sound than the similarity arguments. This manner of basing the consideration that a determinate being is conscious is neither exempt from the basic ontological and phenomenological problems relating to consciousness; but when considering the epistemological method of the inference to the best explanation, these kinds of arguments are much more vulnerable to the critiques that weaken the similarity arguments. According to the theory of the inference to the best explanation, the explanation that brings together more evidence is the one that has a bigger probability of being truth. Thus,

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24 See Allen, Colin, "Animal Consciousness", in Zalta, Edward N. (ed.), *The Stanford Encyclopedia of Philosophy*, 2010, <http://plato.stanford.edu/archives/fall2010/entries/consciousness-animal/> [ref. 22 July 2010].

25 See DeGrazia, David, *Taking Animals Seriously: Mental Life and Moral Status*, Cambridge: Cambridge University Press, 1996.

26 See Allen, Colin, "The Discovery of Animal Consciousness: An Optimistic Assessment", *Journal of Agricultural and Environmental Ethics*, 10, 1998, 217–25.



the data brought together by these composite arguments in order to base the consideration that many nonhuman animals are conscious beings is the largest current body of evidence on this question: is this set of features relating to what in humans we call consciousness that are shared by members of many species what enables to conclude that, probably, they are conscious beings as well.

## 5. CONSCIOUSNESS BEYOND THE HUMAN NEOCORTEX

According to the considerations above, consciousness is not just an ability of many human animals but an ability shared by members of different animal species for which consciousness means an adaptive advantage. Yet, from an opposite position it is still defended that humans are the only conscious beings. For instance, Peter Carruthers, a well-known consciousness theorist, considers consciousness to be an exclusive human ability.<sup>27</sup> This author bases his theories on consciousness on the complexity of the experiences that many humans are able of, as well as in the inability of the members of other species for these tasks;<sup>28</sup> thus, from this point of view it is considered that only certain members of the *Homo sapiens* species are conscious, whereas nonhuman animals and very young humans or humans with certain mental handicaps are non conscious beings. According to these considerations, these latter beings do not deserve to be included into the sphere of moral consideration. These theories often base these considerations in some linguistic and rational abilities that most humans are able of; nevertheless, the fact that most humans are capable of very complex conscious experiences —the so-called selfawareness and metasefawareness—<sup>29</sup> it is not a reason strong enough for concluding that the rest of the vertebrates are not conscious beings. Over and above the fact that some nonhuman animals are able of more

27 See Carruthers, Peter, “Brute Experience”, *The Journal of Philosophy*, 86, 1989, 258–69; Carruthers, Peter, *The Animals Issue*, Cambridge: Cambridge University Press, 1992; and Carruthers, Peter, *Phenomenal Consciousness*, Cambridge: Cambridge University Press, 2000.

28 With regard to the complexity of conscious experiences, it has been seen that there is a phenomenological problem that prevent us from achieving a precise knowledge of another’s consciousness. In this context, as we consider the case of beings that we regard as conscious, the larger the differences between their central nervous systems and sensory systems from the ones that are typical in humans, the larger the barrier to knowing the characteristics of their consciousness, but this fact does not necessarily imply that their conscious abilities are less complex than the normal human ones.

29 For a review of the different levels of consciousness see Morin, Alain, “Levels of Consciousness and Self-Awareness: A Comparison and Integration of Various Neurocognitive Views”, *Consciousness and Cognition*, 15, 2006, 358–71.

or less complex degrees of understanding of the human languages,<sup>30</sup> this ability is not relevant in their natural environments, and also does not seem to be essential for being conscious. Consequently, having a human neocortex —the structure that seems responsible for certain human linguistic and rational abilities— probably is an indispensable condition for having a certain kind of consciousness, but not a *sine qua non* feature for being conscious. Thus, today it is considered that a being is conscious as long as he or she has those structures and patterns of neural activities that seem essential for the generation of consciousness, whereas having a more or less complex brain will only determine the ability of having more or less complex experiences.

## 6. CONCLUSIONS

As pointed out at the beginning of this article, most humans still exploit animals for their own benefit without considering whether this is morally right. Yet, the fact that it is generally agreed that many nonhuman animals are conscious and, therefore, suffer and undergo different kind of deprivations due to the activities that they are subjected to, may affect the way that we interact with them. This change is particularly noticeable in the choices of many humans that choose vegetarianism and veganism as alternatives to other ways of living that imply greater suffering for nonhuman animals.

Besides, it has also been argued that from different ethical positions, such as classical and preference Utilitarianism, certain theories that defend that nonhuman animals deserve moral rights, as well as Contractarian, Egalitarian, Prioritarian and Enoughist approaches, it is defended that all conscious beings deserve moral consideration due to the possession of consciousness. Nevertheless, the task of confirming that those beings that we believe that are conscious are, in fact, conscious is a great challenge for the human knowledge. Since we lack a direct method to confirm whether a being is conscious or not, the most efficient tool that we are currently provided with in order to undertake this task is the scientific study of

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30 Several experiments into the ability of nonhuman animals to understand human languages —such as nonhuman primates and parrots— have been useful in order to prove that these animals are able of complex rational and linguistic abilities. See Pepperberg, Irene M., *The Alex Studies: Cognitive and Communicative Abilities of Grey Parrots*, Cambridge: Harvard University Press, 1999; Gardner, R. Allen; Gardner, Beatrix T. and Van Cantfort, Thomas E., *Teaching Sign Language to Chimpanzees*, Albany: SUNY Press, 1989; Savage-Rumbaugh, Sue and Lewin, Roger, *Kanzi: The Ape at the Brink of the Human Mind*, New York: John Wiley & Sons, 1996; and Rivas, Esteban, “Recent Use of Signs by Chimpanzees (Pan troglodytes) in Interactions with Humans”, *Journal of Comparative Psychology*, 119, 2005, 404–17.

consciousness; as seen above, the most rigorous solution to this problem is to construct composite arguments that bring together data from the different scientific disciplines that study this phenomenon, with which it is possible to construct hypothesis on the higher or lower probability of a certain being to be conscious. Thus, this method enables us to demonstrate that for many nonhuman animals the probability of being conscious is higher than the probability of being unconscious. Likewise, in the case of many other nonhuman animals this method enables us to demonstrate that it is not possible to scientifically rule out that they are conscious beings.

In the final section of this paper, I discussed how these composite arguments are effective in refuting those theories that defend consciousness as an exclusive ability of some human animals.

If the reasons that have been here considered are correct, despite the complexity of the questions relating to consciousness, at present we do have a valid scientific method to demonstrate that many nonhuman animals are probably conscious beings, and therefore to put into practice in a more rigorous way those ethical theories that defend that all conscious beings deserve to be morally considered.