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Which Animals Are Sentient Beings?

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The question that gives the title to this paper, besides having an importance of its own, appears relevant in a perspective that includes all sentient beings in the community of moral patients, or even considers sentient beings the only subjects belonging to such a community (sentientism). If I believe I have direct duties only or also towards all sentient beings, I must know which entities enjoy this characteristic, that is, the property of having states of consciousness (namely, sensations such as seeing, hearing, touching, smelling, etc., as well as positive or negative experiences, such as pleasure, pain, fear, etc.). But the answer to this question is damned difficult.

In fact, exploring the mental life of nonhuman animals is somewhat problematic because, as is well known, there is nothing more complex to study in the universe than the psychological states of others, since we are precluded from direct access to them. We can only have indirect knowledge of them, which in the human world is favored by the presence of language. These limitations make it difficult to reach conclusions with incontrovertible certainty. However, this does not mean that we cannot advance hypotheses endowed with some reliability about which beings are sentient.

A line that until recently appeared balanced, a fair compromise between neo-Cartesian positions (no non-human animal feels) and naive positions (all beings of the animal kingdom feel), we find it expressed in 2012 in the famous *Cambridge Declaration on Consciousness*, signed by eminent scholars (cognitive scientists, neurophysiologists, neuropharmacologists, neuroanatomists, etc.)[1]. This text asserts that it is fully justi-

[1] *The Cambridge Declaration on Consciousness* was written by Philip Low, edited by Jaak Panksepp, Diana Reiss, David Edelman, Bruno van Swinderen, Philip Low and Christof Koch, and declared publicly on 7 July 2012 at the *Francis Crick Memorial*

fied, on the basis of available scientific data, to ascribe consciousness to animal species other than our own. The data that comes from the study of animal behavior, evolutionary theory and physiology (especially neurophysiology) make it reasonable to attribute the ability to feel at least to all or almost all vertebrates, plus cephalopods (highly-developed and extremely evolved marine mollusks such as octopus, cuttlefish, squid, flying squid, musky octopus, etc.). The specimens of these species, in addition to a complex central nervous system, possess *nociceptors*, axonic terminations of sensory neurons that appear to constitute "the machinery or plumbing of pain" (Rollin 1989, 124). *The Cambridge Declaration* closed with the following statement: "the weight of evidence indicates that humans are not unique in possessing the neurological substrates that generate consciousness. Non-human animals, including all mammals and birds, and many other creatures, including octopuses, also possess these neurological substrates" (Low 2012).

Positions of this kind could be found in the books of the best philosophers versed in animal ethics, in which they did not go any further, doubting the capacity of many categories of invertebrates to feel. So, for example, regarding insects, David DeGrazia wrote that "The extreme simplicity of their CNSs makes it unlikely that insects are conscious" (DeGrazia 1996, 105). In his opinion, behavioral data also confirms these doubts: "Their behavior, while sometimes impressive (as in the case of bees and ants), seems explicable in terms of stimulus-response mechanism without consciousness; when studied carefully, it often reveals a stereotyped, as opposed to innovative or flexible, quality" (*ibid.*, 111). Furthermore, another factor that makes us doubt their ability to sense, insects do not protect injured limbs: "They continue normal behavior even after severe injury or loss of body parts. Thus, a locust keeps eating while being devoured by a mantis" (*ibid.*). A position also recorded by Singer in his recent reworking of *Animal Liberation*:

> Some insect behavior is difficult to reconcile with the idea that insect feel pain. When the female praying mantis ceases to think of the male as a lover and instead treats him as a dinner, that does not put an end to his interest in sex with her. Other insects continue to walk on legs that have been crushed and to eat while they themselves are being eaten. (Singer 2023, 19-20)

Conference on Consciousness in Human and non-Human Animals, University of Cambridge, Churchill College.

Similar views on invertebrates such as spiders can be found in a well-known volume by Hal Herzog, where this important psychologist of human-animal relations writes:

> I recently asked Fred Coyle, an arachnologist, what he thought went on in the minds of the spiders he studies. For example, do they plan out the architecture of their webs? Or are their muscles and glands just mechanically following the dictates of genetically programmed neural impulses? I could tell that my question made Fred uncomfortable. "Hmm", he said. After a long pause, he told me that he thought of spiders as robots – predatory AIBOs with eight legs. (Herzog 2010, 64)

These considerations therefore supported the belief that at least all (or almost all) vertebrates and cephalopods are sentient beings. But they advanced strong doubts that sentience could go further.

Compared to the picture just outlined, today there are signs that point in the direction of a further extension of the capacity to experience sensations, beyond the threshold of vertebrates and cephalopods. 2024 has produced a new declaration on animal consciousness, after the famous Cambridge Declaration: *The New York Declaration on Animal Consciousness*. The main text of the declaration, promoted primarily by Kristin Andrews, Jonathan Birch, Jeff Sebo, and Toni Sims, is as follows:

> *The New York Declaration on Animal Consciousness* (April 19, 2024, New York University)
>
> Which animals have the capacity for conscious experience? While much uncertainty remains, some points of wide agreement have emerged.
> First, there is strong scientific support for attributions of conscious experience to other mammals and to birds.
> Second, the empirical evidence indicates at least a realistic possibility of conscious experience in all vertebrates (including reptiles, amphibians, and fishes) and many invertebrates (including, at minimum, cephalopod mollusks, decapod crustaceans, and insects).
> Third, when there is a realistic possibility of conscious experience in an animal, it is irresponsible to ignore that possibility in decisions affecting that animal. We should consider welfare risks and use the evidence to inform our responses to these risks. (Andrews *et al*. 2024a)

As we can see, in the new declaration the expansion, compared to the previous declaration, concerns invertebrates, because it goes beyond cephalopods and in particular it focuses on the sentience of decapod crustaceans

and insects[2]. The authors of the text in the *Background of the Declaration* (a much longer text) provide extensive justifications for the empirical evidence that leads them to extend sentience to many invertebrates. They point out that research in the science of animal cognition and behavior over the last 10 years have shown that not only cephalopods, but also many other invertebrates can have a mental life. For example, in an important recent study (Galpayage Dona *et al.* 2022)

> researchers found that bumblebees roll wooden balls around in a manner consistent with five characteristics of play. First, bees rolled the balls because they found it intrinsically rewarding, rather than as a means to an end. Second, the behavior did not serve an apparent function. Third, the bees were not rehearsing a behavior they use for another purpose, like foraging or mating. Fourth, bees rolled balls repeatedly but not in exactly the same way each time. Finally, the behavior increased when the bees were relaxed, indicating that it was a pleasant experience, not a stress-induced one. (Andrews *et al.* 2024b)

Moreover, a series of studies (for example Bacqué-Cazenave *et al.* 2017) seem to demonstrate that crayfish exhibit "anxiety-like" states, altered by anti-anxiety drugs. And so on. As for the possibility that decapod crustaceans are sentient, Birch himself has played a significant role. In fact in 2021 he led a research group that evaluated the evidence for sentience in cephalopod molluscs and decapod crustaceans (Birch *et al.* 2021). As Singer also notes in his recent revisitation of *Animal Liberation*, according to this study there is a high probability that decapod crustaceans, a group of crustaceans including crabs, lobsters, crayfish etc., possess "sensory receptors for pain" and that "the brains of crabs and lobsters are capable of integrating information from different sources" (Singer 2023, 18-19)[3].

[2] But, truth be told, in a new version of *The Cambridge Declaration*, reported by the site "Animal Ethics" (see *The New York Declaration on Animal Consciousness Stresses the Ethical Implications of Animal Consciousness*, https://www.animal-ethics.org/the-new-york-declaration-on-animal-consciousness-stresses-the-ethical-implications/), we can find in a footnote an important clarification that greatly attenuates the differences with respect to the recent *New York Declaration*: "The Cambridge Declaration on Consciousness was written as the summary of the Francis Crick Memorial Conference hosted by Philip Low at Cambridge University. While it is indisputable that all vertebrates, including fish and reptiles do possess the neurological substrates of consciousness, and that there is further very strong evidence to support that invertebrates, including but not limited to decapod crustaceans, cephalopod mollusks, and insects, also do, only octopuses were explicitly named because there was a scientific presentation on them at the conference".

[3] More generally, for this broadening of perspective see Birch 2024 and Sebo 2025.

With regard to the sentience of insects, the favorable views emerging from recent studies by van Huis (2019) and Vallortigara (2024) are also relevant[4]. According to Mikhalevich and Powell (2020), the unjustified exclusion of arthropods (arachnids, crustaceans, chilopods, diplopods and insects) from sentience up to now is mainly due to the following 4 factors:

(i) a lingering progressivist reading of evolution according to which invertebrates are lower in the *scala naturae*;
(ii) the *a priori* assumption that small brains are unlikely to support sophisticated cognition or sentience (which is contrary to the existing body of behavioral and neuroscientific evidence, principles of evolutionary continuity, and the potential for convergence on psychological functions);
(iii) human cognitive-affective biases that distort moral judgments and mental state attributions concerning unfamiliar, disgust-provoking beings;
(iv) an inappropriate balancing of scientific uncertainty and moral risk.

Faced with this new scenario, DeGrazia himself now appears more cautious than he was 20-30 years ago. Commenting on the study by Mikhalevich and Powell, he asserts:

> there is evidence both for and against attributing sentience to certain arthropods. Representing the largest phylum in the animal kingdom, arthropods include crustaceans such as crabs and lobsters, insects such as ants, bees, and flies, as well as the many varieties of spiders. With crabs, for example, there has been conflicting evidence regarding nociceptive responses; meanwhile, horseshoe crabs in particular have exhibited trade-offs between shock avoidance and access to preferred shells. Insects, too, present evidence for and against attributing sentience to them, or to certain species within the broad range of insects. It is also possible that certain insects such as bees have a form of consciousness that permits them to navigate effectively through space [...] but that they lack the additional factor of affect that is necessary for sentience; on the other hand, in view of evidence cited by M&P [Mikhalevich and Powell 2020] that certain insects have emotional experiences, it may be more reasonable to believe that they are not only conscious but also sentient. Clearly the time has come to attend without prejudice to currently available evidence regarding these creatures' mental lives and to commit to gathering further evidence[5]. (DeGrazia 2020)

[4] However, there are still voices that go against this trend. For example Adamo 2019, according to which perhaps insects have insufficient neurons to support consciousness.

[5] And DeGrazia now claims that his old conception was a bit tied to prejudice: "a vague, semi-conscious thought that insects' having sentience would entail their having

Trying to schematize, without any pretension of solving such an intricate dispute, we can say that there are 5 levels of structural complexity to evaluate:

1. animals (and more generally living beings) without any nervous system; this is the case with porifers (e.g. sea sponges);
2. animals (and no other type of living being) equipped with a nervous system, but not a central one; this category includes echinoderms (marine animals such as sea stars, sea urchins, sea cucumbers), cnidarians or coelenterates (jellyfish, hydras, sea anemones, corals), and ctenophores;
3. animals endowed with a centralized, albeit simple, nervous system, but without an encephalon (this is the case with bivalve mollusks, which possess only a few central nervous ganglia);
4. animals with a central nervous system with an encephalon or brain, but a very simple one (conditions that can be found in insects, arachnids, etc.);
5. animals having a central nervous system with a complex encephalon or brain (vertebrates and cephalopods)[6].

There is broad agreement in arguing that the possession of a central nervous system is a necessary requirement for the possession of sentience. This leads us to exclude states of consciousness in entities that do not possess it and in entities that possess a nervous system, but not a central one. However, according to some, even a central nervous system is not enough to guarantee sentience. It is necessary for this system to be equipped with an encephalon. And according to others, even a nervous system equipped with just any encephalon is not enough. What is needed is a central nervous system equipped with a complex encephalon. Regardless of the maximum demands, it would seem reasonable to exclude from sentience (at least) the first two levels (level 1 and 2).

We can conclude by saying that the closer we get to level 5, the more evidence there is of sentience. The further we move away, the less evidence there is for sentience. Until recently, sentience seemed to be limited to species at level 5. Today there are important openings to the possibility

moral status – an implication that then seemed to me totally unpalatable" (DeGrazia 2020).

[6] A tool that remains essential to summarize the data in our possession and the differences in terms of structures among animal world entities is the "Sentience" section of the "Animal Ethics" website (https://www.animal-ethics.org/sentience-section/). A synthesis of rigor and clarity.

that, in addition to level 5, at least animals at level 4, or at least some species at that level, may share with us the ability to experience sensations and feel pleasure or pain.

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