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Sensing is a far cry from sentience

Commentary on [Segundo-Ortin & Calvo](#) on *Plant Sentience*

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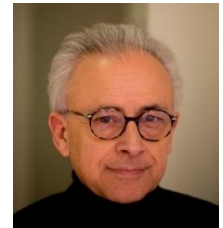
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Abstract: The hypothesis that plants might be sentient confuses the notion of sentience (or consciousness) with that of sensing. Sentience/consciousness implies feeling, experience, and subjectivity. Sensing does not. Plants can sense/detect and even respond appropriately in the absence of any sentience/consciousness.

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Miguel Segundo-Ortin & Paco Calvo (S&C) wonder if plants are sentient and although they clearly believe they are, they pose the question cautiously. They are open to doubt and avoid the peremptory way in which authors who think that all life is sentient often present their views. Their target article is worth reading because of the many findings from the world of plant biology that they competently review. Still, the problem/question of “plant sentience” revolves around a fundamental misunderstanding of the meaning of terms such as *sentience*, *consciousness*, and *sensing*.

Sentience or consciousness concerns the ability to *feel* and thus *experience* the state of a specific living organism. The feeling and experience are purely *subjective*, available only to the *experiencer (self) process* unfolding within that specific organism. Observers can make an informed guess that an organism is conscious based on indirect, external signs (as neurologists we have been doing it all our lives), but can *never* observe sentience (consciousness) directly.

Sensing or detecting, on the other hand, is a simpler process, pervasive in living nature and, in all likelihood, a precursor and support for what eventually became sentience or consciousness. In other words, the presence of sentience/consciousness in a living organism means that sensing is also present. However, the presence of sensing does not allow us to predict that there is consciousness/sentience as well. Physiological precedence and hierarchy need to be observed, i.e. it does not follow that an organism that senses/detects a particular stimulus, can also feel and experience anything. Plants lack any structures or operations capable of plausibly fabricating feelings and enabling experiences. Of note, plenty of artificial devices are capable of sensing, detecting, and responding, and they are not sentient/conscious either.

We believe that the majority of living creatures on earth, plants included, operate at the basic level of sensing, detecting, and responding without ever experiencing anything related to such processes. Sentient, conscious creatures go one step beyond sensing: they come to feel — and therefore *know* — what is going on inside their own living organisms. This additional step is not a luxury. On the contrary, it is a most useful operation because it allows the sentient/conscious organism to respond or not to the consciously perceived stimulus. It opens the sentient organism to the possibility of *deliberate* behavior. Deliberate behaviors are available in humans, obviously, but also, we presume, in numerous species equipped with a nervous system and sentience. We expect all mammals, birds, reptiles, and fish, to be sentient/conscious and we venture that so are some insects.

The most intriguing part of the S&C target article concerns so-called plant “neurobiology”. The term is unfortunate since there is no “neuro” to talk about in plants, but the authors justify the use of the term from the fact that plants can exhibit action potentials and that the action potentials of plants resemble those of animals: they depolarize, repolarize, and hyperpolarize, although they have different resting potentials and different speeds of propagation.

S&C also remind us that plants respond to general anesthetics by suspending several life management processes, including the defensive petal movements of the Venus flytrap and *Mimosa pudica*. This has led to an incorrect conclusion: that because general anesthesia in humans causes a radical loss of sensing that inevitably entails loss of consciousness, the response to general anesthetics in plants would also signify a loss of consciousness (see Baluska and Yokawa, 2021). This assumption is not justified. General anesthetics cause a sweeping disruption of sensing/detecting. If the species in question is capable of also generating consciousness, that will be disrupted as well. This is the case in humans. However, we cannot conclude that a species would be capable of sentience based on the fact that sentience is not present after general anesthetics have blocked sensing! Suppressing sensing in plants tells us nothing about the existence or non-existence of yet another level of function based on it.

Finally, the authors also press the “neuroresemblance” of plants and animals by noting that molecules used by the nervous systems of animals can also be found in plants — the examples include, acetylcholine, dopamine, histamine, noradrenaline, serotonin, and GABA. But while these are fascinating facts, it should be clear that nothing in the world of plants resembles a nervous system, even a simple one, with central and peripheral components, with neurons

and circuits, with ganglia and nuclei, and, importantly, with definable relationships between a nervous system and the non-neural interior of the organism.

The situation of organisms with nervous systems is remarkably different from the situation of plants. A clear distinction can be made between the non-neural interior of the organism and the nervous system that is located amidst that non-neural interior. As we have proposed elsewhere (Damasio & Damasio, 2022, 2023), the possibility of sentience/consciousness emerges from *an interaction between the non-neural interior of an organism and the nervous system located within that interior*. Sentience/consciousness consists of a continued, valenced *experience of the state of the interior*. As it occurs, the experience then serves as a reference for any events that occur in the surround of the organism and that the organism can appreciate thanks to exteroception/proprioception.

The critical terms sentience/consciousness should be strictly reserved for organisms in which feelings and experience are either confirmed or highly likely.

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