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Phenomenology of Vegetable mind

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Purpose

- The goal of my talk is to discuss the present state of understanding of the notion of embodied knowledge with a view to clarifying the nature of the main theoretical difficulties it raises as well as to exploring new directions for overcoming these difficulties.
- Question: "What are they exactly and how can a principled line be drawn between the epistemic capacities of the body and its non epistemic capacities (=skills, dispositions)?"

- 'Mind' can be defined as the process of establishing a equilibrium between a living being and the environment for the purpose of surviving and reproducing.
- It is a process of learning beyond acquired habits.
- Inseparability of body, movements (including skills), and 'mind'. 'Mind' cannot be separated from 'life'.
- The body and its capabilities announce how this process advances.
- From this point of view, we should take seriously the capabilities of sensing, communication, and intelligence of plants. And we must redefine what soul and mind are.

Extended mind

- Answering the question whether a computer has a mind and whether mind is in the brain, Bateson has already maintained in his book published in 1972 as follows:
- "The computer in only an arc of a larger circuit which always includes a man and an environment from which information is received and upon which efferent messages from the computer has effect. This total system, or ensemble, may legitimately be said to show mental characteristics. [...] Similarly, we may say that "mind" is immanent in those circuits of the brain which are completely within the brain. Or that mind is immanent in the circuits which are completely within the system, brain plus body. Or, finally, that mind is immanent in the larger system—man plus environment." (Bateson 1972, p.317)

Inseparability of body, movements (including skills), and 'mind'

- Merleau-Ponty reaches a body-action view while referring to ecology and comparative behavior studies in a book named "Nature". He develops an interesting thought "behavior as a physiological activity using an external circuit" (Merleau-Ponty 1995: 234-247).
- For example, there are several ways to maintain body temperature for animals. The first is to accelerate the heart rate and increase the metabolism, and to perform a physiological reaction quickly.
- Secondly, take actions such as ingesting lots of food and moving to warmer areas.
- Third, physiological or morphological physical changes are made to maintain heat. The last is the slowest response.

- Even with any of these reactions, its purpose is the same. What is important in this example is that behavior and morphological change (i.e. body change) are equivalent for the purpose. What we call actions is considered as an extension of activities within organisms beyond their own body, as long as behavior is concerned, it is a physiological activity using an external circuit.

Still Cartesian

- But, Contemporary philosophy of mind, phenomenology, psychology, cognitive science, and any mind sciences are still caught by the Cartesian concept of mind. It is immaterial, individual, independent, and separated from the living body.
- An animal does not have a mind, not to mention plants.
- Mind is detached from behaviors (it is considered as the cause of behaviors), the body, and the environment.

Aristotelian concept of souls

- According to Aristotle, *the soul neither exists without a body nor is a body of some sort. For it is not a body, but it belongs to a body, ... (414a20ff).*
- The soul is not an independently existing substance. It is the form of the body; it is the capacity of the body.
- Thus, the soul is not an inner spectator as Cartesian cogito is. Aristotle has neither notion of the privacy of experience, nor the incorrigibility of the mental.

Three degrees of soul

- There is a nested hierarchy of soul functions (413a23): (1) Growth, nutrition, reproduction, (2) Locomotion, perception, (3) Intellect (= thought)
- This gives us three corresponding degrees of soul:
 - Nutritive soul (plants)
 - Sensitive soul (all animals)
 - Rational soul (human beings)
- All living things grow, nourish themselves, and reproduce. Animals not only do that, but move and perceive. Humans do all of the above and reason, as well.

Vegetable mind

- Thus, plants have (nutritive) soul in the Aristotelian picture.
- But recent botanical studies, especially those on plant sensing and communication, teach us that the capacities of plants are much richer and more complex than Aristotle had supposed.
- The soul of plants is not only nutritive but also active and intelligent according to those studies. We should doubt the hierarchy of living beings which regards the genealogical tree as an order of values.

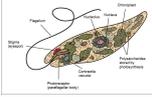
Questions concerning plants' life

- "Are plants intelligent? Do they solve problems and communicate with their surroundings— with other plants, insects, and higher animals? Or are they passive, unfeeling organisms without a trace of individual or social behavior? On the basis of decades of experiments, plants are starting to be regarded as beings capable of calculation and choice, learning and memory."
- Mancuso, Stefano; Viola, Alessandra. Brilliant Green: The Surprising History and Science of Plant Intelligence . Island Press. Kindle.

Vegetable "body"

- The features of plants:
 - Sessility: no-means of self-locomotion, immobile
 - Modular body: constructing a modular body without individual organs while all animals, including humans are endowed with unique organs, and thus every animal is an indivisible organism.

Euglena



- The euglena, a minuscule single-celled green alga, can be classified with the protists, but it has a plant nature.
- It supplies its energy needs through **photosynthesis**, like all plants, but, it has primitive eye (a photoreceptor) with which it perceives light. If light is scarce, it transforms itself into a predator and behaves like an animal. **It can locate food and move to reach it.** The euglena is a plant, but it moves.
- Brilliant Green: The Surprising History and Science of Plant Intelligence (p.25). Island Press. Kindle

The senses of plants

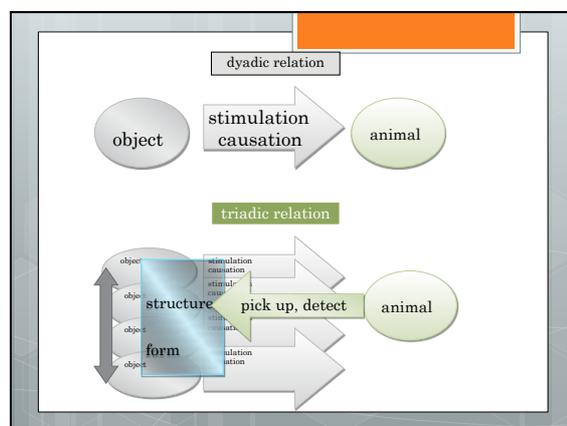
- Plants have all five senses, just like us. And they have fifteen others according to Mancuso (2013).
- Sight: phototropism, escape from shade, roots escaping from lights, deciduous. Plants utilize their epidermal cells just as we use our cornea and lens, to reconstruct real images of the external environment.
- Smell: Plant surfaces often have receptors for volatile substances able to set off a chain of signals communicating information to the entire organism.

- Plants use "smells"—that is, biogenic volatile organic compounds—to receive information from their environment and to communicate with each other and with insects. Each compound transmits precise information, such as warnings of imminent danger, or messages of attraction or repulsion, or something else.
- The tomato, which, when attacked by herbivorous insects, releases great quantities of BVOCs in order to alert other plants, even those hundreds of meters away. Other plants may produce molecules that make their leaves indigestible or even poisonous to the insect aggressor.

- Touch : "the sense of touch is closely related to the sense of hearing and makes use of small sensory organs called mechanosensitive channels, found in small numbers everywhere on the plant but with greatest frequency on the epidermal cells, the cells that are in direct contact with the external environment." Mancuso (p.61)
- Hearing: Recent experiments on the hypogeeal (below the soil surface) part of the plant have shown that the roots perceive a much broader range of sound vibrations, and that the vibrations perceived can influence the direction of root growth, according to a movement called "phonotropism" (p.70).

Animal perception is a sign process

- Animal perception should be regarded as "triadic," not dyadic: perception is not a dyadic relationship between object and subject or matter and mind, but it is a picking-up process of certain "inter-objective" relationship in the environment.
- The "inter-objective" relationships can be spatial and temporal.
- It is to find some relation between objects or between events in the real world.
- A profile of an object already indicates the references to other hidden profiles of that object. To perceive a form of a thing is to pick up the structure, i.e. a related whole, of that thing.



Plants communication

- Inside plant: To transport information from one part of its body to another, a plant uses electrical (signals pass from one cell to another by means of simple openings in their cellular walls, called plasmodesmata) as well as hydraulic and chemical signals.
- Between plants: In order to recognize one's kin plants exchange of chemical signals released by the roots and the leaves.

- The traditional view have seen that plants would adopt a stereotypical and repetitive mechanism
- The plant, in reality, checks out a potential rival before attacking or defending, and if it discovers a genetic affinity, instead of competing it chooses to cooperate.

- Between plants and animals:
- The lima bean, when attacked by especially voracious mites, it releases a mix of volatile chemical substances that attract a different mite, a carnivorous one. This mite specializes in attacking "vegetarian" mites and soon exterminates the entire population.

Vegetal memory (Chamovitz, 2012, p.117)

- The large black hairs on their lobes allow the Venus flytraps to literally feel their prey, and they act as triggers that spring the trap closed when the proper prey makes its way across the trap. If the insect touches just one hair, the trap will not spring shut, but a large enough bug will likely touch two hairs within about twenty seconds, and that signal springs the flytrap into action.
- We can look at this system as analogues to short-term memory. First, the flytrap encodes the information (forms the memory) that something (it does not know what) had touched one of its hairs. Then it stores this information for a number of seconds (retains the memory) and finally retrieves this information (recalls the memory) once a second hair is touched.

Mancuso's conclusion

- "Intelligence is not a term commonly used when plants are discussed. However, I believe that this is an omission based not on a true assessment of the ability of plants to compute complex aspects of their environment, but solely a reflection of a sessile lifestyle. To commence use of the term intelligence with regard to plant behaviour will lead to a better understanding of the complexity of plant signal transduction and the discrimination and sensitivity with which plants construct images of their environment, and raises critical for growing networks in general." Mancuso, p.163.

Conclusions

- Philosophies of mind so far have had strong tendency to tie the characteristics of mind to personal identity and individuality.
- In this framework, mind must be a closed area (or substance) with unchangeable essences.
- This is still the influence of Cartesian and Christian concept of mind. This concept of mind ultimately might come from the fear of death, and it should have some implicit but strong political implications.
- Considering recent development of botany, zoology, and ethology, we should not separate mind/soul/etc. from life.

conclusion

- We should, from now on, have an open definition of mind and enjoy the instability of personal identity and the individuality with change and vague boundaries.
- There is no reason to think that a human soul is in any important respect different from any other non-human soul. The form of one human being is the same as the form of any other.

Plant being as neutralized body and soul Irigaray, 2016, p.100

- “Vegetal being somehow corresponds to a stage of our own becoming; and it is also the environment through which we can leave our past tradition, in which we were divided into neutralized body and soul, toward a world that take into account our identity and subjectivity as they are, that us, as sexuated.”

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Thank you

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