

## Perception: configuration of objects by behavior

Maturana, Humberto. (1987). *Percepción: configuración del objeto por la conducta*. Arch. Bio. Med. Exp. 20: 319-24. Translated into English by Cristina Magro

### Abstract

The word *perception* is currently heard as if it connoted an operation of capture of an external reality, through a process of reception of information of this reality. Nevertheless, this is constitutively impossible, because living beings are structurally determined dynamic systems, and everything that happens in them is determined at every moment by their structure. This means that the medium can not specify what happens in a living system, and that it can only trigger in its structure changes that are determined by its structure. As a result, constitutively a living system operates always in structural congruence with the medium, and exists as such only insofar as this structural congruence (adaptation) is conserved. Otherwise, it disintegrates. In these circumstances, the phenomenon connoted with the word *perception* consists in the association - by the observer - of the regularities of behavior that he or she distinguishes in the observed organism to the conditions of the medium that he or she sees triggering. The observer uses such behavioral regularities to characterize perceptual objects. This can be applied to all living beings, including the observer. The explanation of perception in the context of the structural determinism of living beings invalidates any effort to give an account of the phenomenon of cognition (including language) with notions that imply the denotation or connotation of the domain of reality independent of the distinctions of the observer.

### 1. The question for perception

#### *Antecedents*

Traditionally, in neurobiology and psychology as well, the current discourse about the phenomenon connoted by the word *perception* is such as if it consisted in the computation of objects from the medium by the nervous system, from the capture of information by the organism's sensorial organs in its interaction with this medium. In this process, the nervous system would build a representation or abstraction of the medium, that would allow it to generate behavior that is adequate to the several circumstances of interaction of the organism. At the same time it is said as if the cognitive capacities of the observer were explained the same way. We shall note that this way of talking has an operational meaning only insofar as it is grounded in the presupposition that there is a mechanism through which the medium, acting upon the organism, specifies in it structural changes that represent this same medium. Or, to put it another way, the presupposition that the participation of the nervous system in determining the organism's behavior occurs through the generation of a medium's representation (or abstraction) in the interior of the organism, necessarily assumes the operation of this sort of mechanism. This way of speaking about *perception* and the operation of the nervous system has not only a merely metaphoric or didactic value, but reveals a fundamental implicit epistemological posture, as the quotations in the appendix well illustrate. This stance presupposes that:

- a. a reality constitutively independent of the observer who is an operator that explains it actually exists, and it is external to this observer as organism;
- b. the observer can know this reality as a result of its interactions with it, even distortedly or partially; and
- c. The descriptive categories that we utilize in our explanatory discourse as objects, relations, structure, belong to this reality and not only to what the observer does or says.

### ***The problem***

In 1943, Roger Sperry carried on amphibians' eye rotation experiments (Sperry, 1943). In these experiments, he showed that animals "recovered vision", but oriented themselves in the prey capture behavior with an angle alteration which was identical to the revolution made in their eye. Thus, having an animal had its eyes turned 180 degrees, when confronting a prey presented in its anterior visual field, this animal turns and throws its tongue as if the prey had been presented to it in its posterior visual field. In the interpretation of this experiment, it is commonly said that the animal is mistaken and asked if it can correct its error. Such an interpretation implies the presupposition that the animal directs its tongue to a prey external to it, and that it is mistaken because its mechanism for the capture of information and for computation of behavior is altered. Then, if by altering the structure of the organism we alter perception, what the phenomenon we connote when speaking about *perception* consists of? If the capture of informations depend on the instrument, which basis allow us to claim that what the instrument shows is something we can say is characteristic of an object independent of this same instrument?

### ***Difficulties***

We assure, and the quotations presented in the appendix confirm, that the manner of speaking about perceptive phenomena and the operation of the nervous system in terms of capture of information and constitution of a representation of the medium is not metaphorical or didactic, but it reveals an explanatory paradigm that is biologically and epistemologically inadequate, because it assumes that the changes the organism undergo in its interactions with the medium are determined, in some way, by the medium. We think that this is not possible, because, as we have already said in previous works, the attempt to explain living beings biologically (scientifically) requires that they be treated as structurally determined systems, and such systems do not admit instructive interactions (Maturana, 1975 and 1980). In these circumstances, the question by the phenomenon of perception is open. On the other hand, if the manner of speaking quoted above is only metaphorical and didactic, it does not have any explanatory value, and the question for perception remains, therefore, open. Our aim in this article is to answer such question showing the mechanism that gives origin to situations we call *perceptual*, not only without contradicting the structural determinism of living beings, but also utilizing this structural determinism in our explanation.

### ***The question***

As we already stressed above, living beings are constitutively dynamic systems structurally determined and, as such, do not admit instructive interactions (Maturana, 1975 and 1980). As a consequence, we can affirm that:

- a. Everything that happens in an organism occurs in it at every moment determined by its structure;
- b. While an organism exists, it conserves its organization in an interrupted history of interactions with the medium in which it realizes itself;
- c. The existence of an organism as a dynamic system consists in a flow of structural changes that follow a path that is contingent with the interactions it has with the medium, under conditions of conservation of its structural correspondence with it and that otherwise it disintegrates;
- d. Due to what has been said in (a), the structure of an organism determines the structural configurations of the medium with which the organism can meet itself in its interactions; and

- e. Also due to what has been said in (a), the interactions with the medium can only trigger in the organism structural changes determined by the organism itself (Maturana, 1980).

All that has been said implies that the medium can not specify what occurs to an organism and it invalidates the foundations of any conception that talks about *perception* as a process that reveals characteristics of an independent reality of the perceiving organism, even if only in a distorted and partial manner.

What happens then?

What is perception?

How is configured the object which it is said that perception perceives?

## 2. Answers

While answering these questions, we will realize that the behavior of an organism is only a description that the observer does of a sequence of postural changes (structural) that the organism exhibits in relation to the medium in which it is observed. These postural changes are expressions of the structural dynamics of the organism, and they appear with the participation of the nervous system when it exists. Since the observer distinguishes the organism as a system that moves in a medium, conserving necessarily its structural correspondence with it (adaptation) (Maturana 1980; Maturana and Varela, 1985), the observer can distinguish behaviors that appear in the organism associated to its interactions. It is in this context of the association between behavior and medium configured by this distinction that the word *perception* is habitually used, supposing that such behaviors emerge from the determination of the organism (or of its nervous system), in the level of the sensorial encounter, by an external object. Nevertheless, by what we have already said, it is clear that the phenomenon that we connote with the word *perception* can not consist in such a determination, but it consists, indeed, in a regularity of behavior exhibited by the organism in its operation in structural correspondence with the medium, which the observer indicates as if he or she distinguished an object, associating it to the environmental circumstance that triggered it. This requires an additional explanation.

The organism is a structurally determined system and, therefore, in the interaction between organism and medium it is the organism that determines which structural configuration of the medium triggers in itself a structural change. Due to this, the observer can not characterize such a structural configuration independently of what occurs in the organism as a consequence of the occurrence of an interaction. Because of that, it is only through changes in the behavior of an organism that an observer can characterize the medium in terms of structural configurations that act as perturbational agents (perturbations) in the interaction. In other words, it is only through changes in behavior distinguished by an observer in an organism during the contingencies of a given perturbation, that the observer can characterize such a contingency as an “perturbational object” and describe it as an object to (something independent of) the organism. Finally, it is this association that the observer makes between the “perturbational object” - characterized by the behavior of the organism that configures it - and such behavior independently distinguished by the observer, what constitutes the phenomenon that one connotes daily with the word *perception*.

We should note that the utilization the observer makes of the organism’s behavior while describing a perturbational agent, be it as a “captured object”, or as a “source of sensorial information” that originates perception, implies conceptually an explanatory paradigm in which the organism generates its behavior operating over representations of the medium obtained through the capture of objects external to it. Nevertheless, as we saw, the organism can not operate like that, insofar as the perturbations can only trigger in it changes that are determined by its structure. The structural correspondence between organism and medium does not emerge

from the determination of the organisms by the medium, but occurs constitutively as a condition of organism's existence in its historical dynamics of interactions with the medium, while maintaining its organization and adaptation (Maturana and Varela, 1985).

### 3. Conclusions

The phenomenon we connote with the word *perception* does not consist of the capture, by the organism, of objects external to it, as neurobiology and psychology's traditional ways of speaking presuppose. It does not consist either in the specification, by the medium, of changes in the organism resulting in which this organism operates based in a representation of the medium in the generation of behavior. On the contrary, the phenomenon connoted by the word *perception* consists in the configuration of perceptual objects made by the observer, through the distinction of operational cuts in the organism's behavior, while describing interactions of this organism in the flow of its structural correspondence with the medium.

The harmony between organism and medium that seems to be rescued with the traditional concept of *perception*, therefore, is proper to this flow of the organism's structural changes in the conservation of its adaptation, and fails when this structural correspondence is lost. The study of perceptual phenomena as cognitive phenomena is, therefore, the study of different recurrent moments of the structural flow of the organism coupled to the structural flow of the medium, as moments of a history of interactions that implies in the conservation of the structural correspondence between organism and medium.

All that was said above is applicable to all organisms, including to ourselves as observers giving explanations and descriptions, because our condition as such also emerges in our operation as structurally determined living beings. That this is so invalidates any intention of explaining cognitive phenomena, including language, as phenomena associated to a connotative or denotative function of a reality independent of the observer.

### 4. Reflections

To close our exposition, we would like to bring four considerations about the implications to the human operational and epistemological domain that the comprehension of the phenomenon of perception:

- a. The distinction we usually make between *illusion* and *perception* is based in the understanding that *perception* is the experience of capture of a reality independent of the observer, while *illusion* is an experience that we live "as if" it was perception, but that occurs in an inadequate connection with an external reality. What we have said shows that such a distinction is impossible since, constitutively, there is no capture of an external object in the perceptual phenomenon. This is corroborated in daily life by the fact that the distinction between illusion and perception is made exclusively by reference to another experience different from the experiences one qualifies with this distinction.
- b. Since perceptual objects appear as configurations within behavior, the world of shared perceptual objects belongs to the domain of coordinations of operations between organisms, who constitute them in the flow of their common life as configurations of these coordinations of behavior. In other words, if perceptual objects become configured by organism's behavior, the world of perceptual objects that occurs in the sociability of organisms, including the observer, can only appear through this sociability while organisms operate generating and maintaining their mutual structural correspondence. That this is so is also

apparent in our daily life, in which we know that a common world only emerges in the community of living.

- c. The operation of the observer in language consists in a manner of living in the recursion of coordinations of behavior that appear in the community of living (Maturana, 1978), which configure a world of perceptual objects in the way indicated in b. Language and the operation of the observer, therefore, do not require nor give origin to references to an external reality. The world of the observer's descriptions and explanations is a world of ways of sociability generator of perceptual objects, in which the observer emerges as one of them when language appears (Maturana, 1978). In that resides the generative and transformative power of the world which exhibits language and the explanations given in language.
- d. The fact that in language we manipulate objects as structurally determined entities independent of the observer, with which we configure descriptions and explanations of the world we live in, does not constitute a contradiction to our explanation of the phenomenon of perception. In previous works, one of us shows that objects emerge with language and that, as such, they consist of coordinations of actions in a community of observers and constitute, ultimately, explanations of the spontaneity of the flow of experience through the operational coherences of experience (Maturana, 1978; Maturana and Varela, 1985). For this very reason, the perceptual objects we talked about in this paper are objects that appear in language, and can be used recursively in the explanation of the phenomenon of perception. In these circumstances, the structural determinism we respect and utilize in our explanations belongs to the operation with perceptual objects as an expression of operational coordinations of the observer's experience, and does not violate the epistemological conditions of our explanation, nor validates the access to an independent reality.

## Appendix

1. "Absolutely all of our knowledge about the reality surrounding us is based on the reporting done by a wonderful and already well researched sensorial and neural apparatus that form perceptions from data supplied by the sense organ..." (Lorenz, 1981:41)
 

"The fact that an organism receives information does not imply unconditionally that it *learns* something, although of course the receiving of new information is an indispensable prerequisite for learning... As in any other adaptive process, adaptation *to* a certain given in the organism's environment invariably means that the information *about* this given must somehow be fed into the organic system." (Lorenz, op. cit.: 221)
2. "Our contact with the external world occurs through specialized neural structures called *sensory receptors*. At these receptor organs, various natural stimuli that impinge upon our bodies are transformed into neurally relevant signals. We receive information not only from the external world, but also from within our bodies." (Martin, 1981:158).
3. "The corner-stone of the scientific method is the postulate that nature is objective." (Monod, 1971)
4. "Sensations are set by the encoding functions of the sensory nerve endings and by the integrated neural mechanics of the central nervous system. Afferent nerve fibers are not high fidelity recorders, for they accentuate certain stimulus features, neglect others. The central neuron is a story-teller with regard to the nerve fibers, and it never completely truthwothy,

allowing distortions of quality and measure... Sensation is an abstraction, not a replication of the real world.” (Mountcastle, 1975:109)

5. “The end effect of stimulating a sensory system is to produce a behavioral response of the organism. In studies of animals, the only end effect we can measure is an observable reflex response. In human experience, however, we know that a reflex response may or may not be obligatory; in most cases, what is produced is an internal representation, an conscious image of the stimulus, and we then proceed to act on that. This process of producing an internal image we call *perception*. It involves our recognition that the stimulation has occurred, and our ability to discriminate various aspects of the stimulus.”

“The study of the quantitative relations between stimulus and perception constitutes the field of *psychophysics*. One of the aims of sensorial neurobiology is to understand the neural mechanism underlying these relations. The ultimate aim is to identify the *building blocks of perception* - the functional mechanism used to construct our representation of the world about us.” (Shepherd, 1983: 197)

6. “My thesis is that human knowledge can be considered as a special development of the process of obtaining informations to life that is essential in all organisms.” (Young, 1987:79)

## Acknowledgments

We acknowledge what is never adequately expressed, but that can in no way be forgotten: the permanent contribution that, through conversing, Patricio Huerta, Rafael Panteón and Cecilia Babul made with creative intelligence and sobriety.

## References

- Lorenz, K. Z. (1981). *The Foundation of Ethology*. New York, Springer Verlag.
- Martin, J. H. (1981). In: Kandel, E. R. and Schwartz, J. H. (Eds.) *Principles of Neuroscience*. North-Holland, Elsevier.
- Maturana, H. R. (1975). The organization of the living: a theory of living organization. *Internat. J. Man-Machine Studies* 7: 313-332.
- Maturana, H. R. (1978). *Biology of Language: Epistemology of Reality*. In: Miller, G. And Lenneberg, E. (Eds.). *Psychology and Biology of Language and Thought*. New York, Academic Press. p. 27-64.
- Maturana, H. R. (1980). *Autopoiesis, Reproduction, Heredity and Evolution*. In: Zeleny, M. (Ed.) *Autopoiesis, Dissipative Structures and Spontaneous Social Order*. AAAS Selected Symposium. 55. Westview, USA. p. 45-79.
- Maturana, H. R. and Varela, F. J. (1985). *The Tree of Knowledge. Biological Basis of the Human Understanding*. Berkeley, Shambala.
- Monod, J. (1981). *Chance and Necessity: an Essay on the Natural Philosophy of Modern Biology*. Knopf, New York.
- Mountcastle, V. B. (1975). The view from within: pathways to the study of perception. *John Hopkins Medical Journal* 136: 109.
- Shepherd, G. M. (1983). *Neurobiology*. London, Oxford University Press.
- Sperry, R. (1943). Effect of 180 degrees rotation of the visual field in visuo-motor coordination. *J. Exp. Zool.* 92: 263-279.

Young, J. Z. (1987). *Philosophy and the Brain*. London, Oxford University Press.