Brevísimo análisis doxográfico sobre el Constructivismo: de los presocráticos a la cibernética de segundo orden

A (Very) Brief Doxographical Analysis of Constructivism: from Pre-Socratics to Second-Order Cybernetics

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DOI: http://dx.doi.org/10.15366/bp2018.18.003
Bajo Palabra. II Época. Nº18. Pgs: 61-76

Recibido: 23/02/2017
Aprobado: 29/07/2018

Resumen

El constructivismo es una corriente filosófica con una fuerte presencia en la epistemología contemporánea. Esta escuela de pensamiento suscribe la tesis de que el conocimiento se construye activamente por el sujeto cognoscente y responde a una forma de situarse frente a la experiencia, siendo esta la última realidad efectivamente accesible. Este trabajo traza una breve curva interdisciplinar que comprende algunas de las más importantes posturas filosóficas que contribuyeron a la consolidación de esta escuela de pensamiento durante más de veinticinco siglos.

Palabras clave: *constructivismo, cibernética, epistemología, historia de la filosofía, percepción, realidad.*

Abstract

Constructivism is a philosophical current that manifests itself greatly within the realm of contemporary epistemology. Its bases come from the idea that knowledge is not only actively constructed by the observer but also provides a lens through which reality can be interpreted as a result of experiences. This paper traces a brief interdisciplinary curve that outlines some of the most important philosophical approaches that contributed to the consolidation of this school of thought for more than twenty-five centuries.

Keywords: *Constructivism, Cybernetics, Epistemology, History of Philosophy, Perception, Reality.*

Hilary Putnam was not entirely right when he argued that "it is impossible to find a philosopher before Kant and after pre-Socratics who was not a metaphysical realist, at least about what he took to be basic or unreducible assertions[1]". In other words, a philosopher who does not tie the idea of reality to the notion of objective validity. This paper belies such assertion and draws a brief historical review of some authors whose contributions gradually consolidated a new epistemological approach to the study of reality.

Constructivism in the Classical period

The first theoretical settlements of this philosophical trend were born in the pre-Socratic era, by the hand of philosophers such as Alcmaeon, Heraclitus, Xenophanes, Democritus, or Protagoras. All of them may be considered as precursors of Constructivism. Notwithstanding, much before the birth of the *Old Stoa*, the *Vedas*, the four oldest sacred texts of Indian literature, already reflected these philosophical principles asserting that reality is *Maya*, a Sanskrit word whose meaning is "delusion" or "illusion", which refers to a limitation of universal consciousness that flows through our senses and constrains us to perceive multiplicity over unity.

In the Classical Greece, Xenophanes, concerned about the influence that certain beliefs might have in the Greek society, asserted: "The Ethiopians represent their gods black, and flat nosed; the Thracians theirs swarthy and blue eyed, and they assimilate the minds of their gods to their own[2]". With this ironic critique to the anthropomorphism, Xenophanes suggested that perceptions are closely influenced by religious beliefs, thus every man or race will depict their gods with their own particular features and attributes. This thought spread afterwards to the Sophists, such as Gorgias, who claimed that knowledge is something that occurs within the observer, limiting it to be an individual phenomenon. In this sense, all knowledge would be reduced to individual experience and built through the senses and the contents of memory. And Protagoras, with his aphorism Ánthrōpos

[1] Glasersfeld, E. von, "Introduction to Radical Constructivism", *The Invented Reality*, New York, Norton Press, 1984, p. 18.

[2] Ensor, G., *A Review of Miracles, Prophecies, & Mysteries of the Old and New Testaments and of the Morality and Consolation of the Christian Religion*, London, John Brooks, 1835, p. 85.

metron[3], held that reality is only what is manifested in the consciousness of the observer. As a result, the knowledge that an individual possesses of the world is because of it has been acquired according to his own experience. Protagoras' relativism denied that perception was a reliable image of reality. The act of perception varies from subject to subject according to different situations, denying all possibility of true knowledge. In this way, the value of plurality, the abstention of all judgment, and every attempt to unify the thought entail the consideration of each one of the different realities constructed according to the individual perspectives of each subject. Reality is presented differently according to the experience, so that any attempt to impose a supposed universality to the world is considered as an act of domination.

In the Hellenistic age, Pyrrho of Elis revisited some pre-Socratics postulates and aver that perception reveals what appears, but it does not offer a direct testimony of what really is. The Pyrrhonian legacy was preserved for several centuries, until Sextus Empiricus revived some Pyrrhonian tenets in *Outlines*: "The apple seems smooth, fragrant, sweet, yellow. But it is not evident whether it really has these and only these qualities; or whether, having only one quality, it appears differently depending on the different constitutions of the sense organs, or again whether it has more qualities than are apparent but some of them do not affect us[4]". Thus, "we shall not be able to say how any external object or state of affairs is in its nature, but only how it appears in relations to a given way of life or law or custom, and so forth[5]".

Constructivism in Renaissance

The arrival of Renaissance brought with it a series of scientific, philosophical and theological ideas that marked a turning point in constructivist philosophy. René Descartes, considered the epigone *par excellence* of scientific revolution of his time and the father of rationalism, retrieved some constructivist approaches from the pre-Socratic philosophers, such as perception becomes the sum of the operations of cognition. In his *Second Meditation*, Descartes limits the act of perceiving to an act of consciousness on the sensation itself: "Yet I certainly seem to see, to hear, and to be warmed. This cannot be false; what is called 'having a sensory

[3] In Greek: ἄνθρωπος μέτρον ("Man [is] the measure [of all things]"). Motto of Protagoras as quoted in Plato's *Theaetetus* 152a.
[4] Sextus Empiricus, *Outlines of Pyrrhonism*, Oxford, Oxford University Press, 1996, pp. 18-19.
[5] *Ibid.*, p. 29.

perception' is strictly just this, and in this restricted sense of the term it is simply thinking[6]".

Nevertheless, Cartesian ideas had already been formulated before by other contemporary philosophers, such as Francisco Sánchez, "the Skeptic". Sánchez's philosophy introduced a phenomenology of probability, according to it our knowledge is merely probable and only of appearances. Even prior to the development of Sánchez and Cartesian tenets, the English medieval philosopher William of Ockham, a representative of nominalism and one of the precursors of empiricism, introduced in his philosophy an epistemological nominalism that questioned the certainty of our knowledge about the physical world. Anticipating Descartes, Ockham suggests that if the observer can possess an intuition without the existence of an entity that causes such intuition, then he cannot be sure of reality he senses or perceives, so all science of nature turns into problematic. These Ockhamist ideas are also present in the Cartesian hypothesis of the "malicious demon": "I will suppose therefore that not God […], but rather some malicious demon of the utmost power and cunning has employed all his energies in order to deceive me[7]". This malicious demon hypothesis suggests that our recognition of something as true is a consequence of our nature, so if we could change our nature our perception of reality would also change.

Half century later, one of the most important constructivist innovators of that time was Giambattista Vico. With his principle *Verum esse ipsum factum* ("The true itself is made"), Vico opposed to Cartesian rationalism insofar as he regards creativity as a properly human faculty, so the only knowable truth lies in the results of the creative exercise of human action. In *De Antiquissima Italorum Sapientia*, Vico asserts:

"For if the senses are [active] faculties, we make the color of thigs by seeing, flavor by tasting, sound by hearing, and heat and cold by touching. […] In keeping with these examples, true intellect is a faculty by which we make something true when we understand it. […] It follows from these arguments that, just as man by activating his mind brings the modes and images of things into being and generates human truth[8]."

This quotation summarizes Vico's philosophy about cognitive process, emphasizing that we cannot apprehend the world without a perception. The observer is a cognizer, the cornerstone of the act of knowing, and it is in human mind where the principles and the causes are located. A few years later, in *Principi di Scienza*

[6] Descartes, R., *Meditations on First Philosophy*, Cambridge, Cambridge University Press, 1996, p. 19.
[7] *Ibid.*, 15.
[8] Vico, G., *On the Most Ancient Wisdom of the Italians*, Ithaca, Cornell University Press, 1988, pp. 93-94.

Nuova, Vico defined science as a source of knowledge that aspires to universal and eternal principles. However, for Vico knowledge does not correspond to the immutable realm of truth, but it is the effort to make things correspond each other in beautiful proportions. That is why he draws a distinction between what he considers *coscienza* (consciousness), the study of particular facts, and *scienza* (science), the study of truth, that is, universal and eternal principles applicable anytime and anywhere.

Vico's contributions to Constructivism entailed a rupture with traditional epistemology that since Plato attempted to apprehend how the world is essentially. In contrast, Vico's ideas suggested that we can only know what is somehow constructed by us through our experience, so nothing we construct claims for a real truth in terms of an ontological reality.

Constructivism in the Enlightenment Period: The Empirical Legacy

From the mid-seventeenth century, among the empiricists, John Locke suggested that experience is the only thing to be considered when addressing knowledge. Locke's concept of *tabula rasa* asserted that all our knowledge has been actively constructed through the sensory perception of the world and experience, but it also requires the help of reason. As Descartes, Locke accepts the thesis that secondary qualities of physical entities (v.gr.: color, taste, texture, etc.) are not present in nature, but they are attributions created in the mind of the observer. However, Locke adds that these secondary qualities are the result of the interaction between human mind and the physical entities:

"Qualities thus considered in bodies, are, first, such as are utterly inseparable from the body, in what state so ever it be; such as, in all alterations and changes it suffers […] These I call original or primary qualities of body, which, I think, we may observe to produce simple ideas in us, viz. solidity, extension, figure, motion or rest, and number. […] Secondly, such qualities, which, in truth, are nothing in the objects themselves, but power to produce various sensations in us by their primary qualities, i.e. by the bulk, figure, texture, and motion of their insensible ports, as colors, sounds, tastes, …, these I call secondary qualities[9]."

Thus, our knowledge of the external world is mediated by our knowledge of these secondary attributions which must have a certain degree of resemblance with the physical entities.

[9] Locke, J., *An Essay Concerning Human Understanding*, London, T. Tegg and Son, 1836, pp. 171-172.

Nevertheless, Locke's ideas fail to solve some problems of Cartesian dualism. The attributions by means of which we apprehend the outside reality do not guarantee a reliable knowledge of this 'supposed' external world, because this is hidden behind the veil of such attributions. For Locke, these attributions impose the limit to our understanding of reality. The cognizer has access to the represented images created through sensorial contact with these entities, but not with the entities themselves. Locke expresses it in *An Examination of P. Malebranche's*, of posthumous publication: "Impressions made on the retina by rays of light, I think I understand; and motions from thence continued to the brain may be conceived, and that these produce ideas in our minds I am persuaded, but in a manner to me incomprehensible. This I can resolve only into good pleasure of God, whose ways are past finding out[10]". Locke's philosophical postulates settled the foundations for a constructivist tradition with an empiricist origin that would reach its peak with many contributions in the eighteenth century.

At the beginning of the eighteenth century, with the arrival of Enlightenment, the Irish philosopher and Anglican bishop George Berkeley recognized himself as an important precursor of this constructivist epistemology. With his aphorism *Esse est percipi* ("To be is to be perceived"), Berkeley developed a stream of thought based on a subjective idealism, later called *immaterialism*, which assumed that the world is not transcendent, it exists only through the act of perception. In this doctrine, Berkeley denied the existence of material corpuscles and suggested that the physical world is the result of the ideas that God transforms manifestly sensitive for our perception[11]. This opinion was also shared by the French philosopher and theologian Nicolas Malebranche, who quotes in *De la recherche de la verité*: "When we perceive something sensible, two things are found in our perception: sensation and pure idea. The sensation is a modification of our soul, and it is God who causes it in us[12]".

Unlike Locke, Berkeley does not accept the idea of a sensible entity is anything more than we can perceive sensorially; however, he accepts the Lockean argument about the secondary qualities of entities allow us to apprehend the primary ones. Berkeley agrees in this point with Locke, as well as the ideas proposed by Malebranche, who suggests in *Conversations chrétiennes*: "Color, pain and all other sentiments are only sensitive perceptions, result of intelligible ideas[13]".

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[10] Locke, J., *The Works of John Locke*: *Volume 9*, London, Harvard College Library, 1812, pp. 217.

[11] This idea had already been asserted centuries ago by theologians, such as St. Dionysius the Areopagite's who held that only God has the power to convert the intelligible into sensible for our understanding.

[12] Malebranche, N., *The Search after Truth*, Cambridge, Cambridge University Press, 1997, p. 234.

[13] Malebranche, N., *Conversations chrétiennes: Méditations sur l'humilité*, Paris, Vrin, 2010, p. 153.

Within the constructivist position of his philosophy, Berkeley also assents the proposals of Locke and Descartes about the impossibility of knowing the material entities that cause the perceptions, since the only access we have to obtain knowledge of an entity is the perception that this entity projects in us. On the contrary, Berkeley assumes that when one refers to an entity of natural world, one actually refers to the one's perception of such entity, and it is language that makes possible to extend particular observations to the general domain, not the abstraction. Unlike Locke, Berkeley's position assumes that knowledge of the empirical world is obtained only through sensible perception, without the aid of reason. Consequently, the aim of science must be to eliminate all intellect from human perceptions, since the physical world is the set of perceptions that God creates in us, so God resides in every single of our perceptions and in the coherent order of all ideas.

Another coetaneous and leading empiricist of Constructivism was the philosopher David Hume whose philosophy was strongly influenced by the empiricist ideas of Locke and Berkeley, asserting that all knowledge derives from sensible experience which is the only reliable source of knowledge. So, in *An Enquiry*, Hume quotes: "I never catch myself at any time without a perception, and never can observe anything but the perception. When my perceptions are remov'd for any time, as by sound sleep; so long am I insensible of myself, and may truly be said no to exist[14]".

Constructivism in the Enlightenment Period: The Kantian Revolution

Although the empirical legacy spanned until the end of the eighteenth century, it was not until the arrival of Immanuel Kant that Constructivism recognizes itself as a genuine epistemology. The innovation of constructivist thought arose from Kant's assertion that the judgments which emanate from experience (*a posteriori*) are deprived of universality, and only those aprioristic forms (*a priori*) acquire universal validity, through which we can perceive all the diversity of phenomena. In this way, reality is understood as the collective conception of all entities emanating from experience.

According to Kant these *a priori* forms of perceptions must be innate (v.gr.: space, time and causality) and necessary to structure and organize the knowledge generated by experience, so these *a priori* forms describe the framework within which the cognizer operates. These aprioristic forms also act as filters of perception

[14] Hume, D., *A Treatise of Human Understanding*, Oxford, Clarendon Press, 1888, p. 252.

and prevent us from having direct access to the study of natural entities. In addition, they function as internal representations, e.g., models of reality that allow us to construct not only the surrounding world, but also our behavior and the way of intervening within it. In Kant's words:

"Our cognition arises from two fundamental sources in the mind, the first of which is the reception of representations (the receptivity of impressions), the second the faculty for recognizing an object by means of these representations (spontaneity of concepts); through the former an object is given to us, through the latter it is thought in relation to that representation[15]."

Therefore, all the entities that shape our experience are necessarily determined by our way of structuring space, time and causality. However, if we consider these forms as innate ways of experiencing the world (*a priori*) they would become part of the sphere of the phenomena and not of the reality itself. Thus, recapturing Sextus Empiricus' example of the apple, the properties of the apple are not only questioned, but now also the condition of the apple itself as an independent entity separated from the rest of the world.

This approach presents a problem. If our senses cannot provide us with a complete certainty of an objective structure of reality, how would be possible to configure a structure in our experiential scheme when this structure is not provided by reality? Kantian thesis depicts an epistemological trouble because of it is not able to explain the origin of these representations. In addition, his notion of *a priori* refers at the end to a revised Platonic version of the ideas as categories.

However, Vico had already paved the path for solving this problem some years earlier: "The true is precisely what is made[16]". In other words, the world we experience is so because we have constructed it. Unlike Kant, for whom such construction is determined by unalterable *a priori* forms of thought, Vico argues that the way in which we construct our world of experience is determined by our history, that is, what is built previously limits what can be built now. So all construction carried out by the cognizer is, in sum, the result of all previous construction, so every act of construction is causally determined. Vico's ideas assume a mechanist view of the world introducing the notion of causality. Every act of construction is the result of an antecedent, of constructing a reality according to a mode of active operation of the cognizer at a given moment.

Another important contribution of Kant to Constructivism was the role of consciousness in the act of perceiving, considering that reality cannot be perceived in

[15] Kant, I., *Critique of Pure reason*, Cambridge, Cambridge University Press, 1888, p. 193.
[16] Vico, G., *On the Most Ancient Wisdom of the Italians*, *op. cit.*, p. 46.

its natural form, since an act of perceiving is performed the cognizer orders the sensory data in a theoretical or mental frame:

"It may look, to be sure, as if the possibility of a triangle could be cognized from its concept in itself (it is certainly independent of experience); for in fact we can give it an object entirely a priori, i.e., construct it. But since this is only the form of an object, it would still always remain only a product of the imagination, the possibility of whose object would still remain doubtful, as requiring something more, namely that such a figure be thought solely under those conditions on which all objects of experience rest[17]."

Kant's ideas entailed a new Copernican revolution to the hitherto passivity of the observer. The observer is considered happened to be considered as an active entity and the act of knowing modifies the perceived reality. For Kant, we can only know what our mind constructs, which is at the same time a necessary condition of knowledge, but we cannot know the external reality, that is, the world independent of the observer.

Constructivism in the Twentieth Century: The Evolutionary Theory of Knowledge

At the end of the nineteenth century, the study of the brain became fundamental because of its role in the cognitive process which articulates the way knowledge is configured. New researches in the study of cognitive processes focused special attention to the neurophysiological bases of living organism that intervene in the processes of interpretation and representation of knowledge. Thus, Constructivism became part of the cybernetic paradigm of perception, that is, the construction of invariants that function as schemas and that allow, at the same time, to order the whole flow of experience. This new approach to the study of reasoning involved a paradigm shift, focusing special attention on those adaptive patterns of living organisms with the environment and binding the mental functions of these organisms to the same process. The adoption of this evolutionary approach in the study of knowledge acquisition was called *Evolutionary Theory of Knowledge*, and was originally developed by ethologists, biologists that study animal behavior in their natural habitat.

At the beginning of the twentieth century, the German biologist Jakob J. von Uexküll, considered as the father of ethology, carried out important researches into

[17] Kant, I., *Critique of Pure Reason*, *op. cit.*, p. 324.

what he called *Umwelt*, or "surrounding world". Uexküll hypothesized that each living organism possesses a set of genetic predispositions that allow it to perceive a series of stimuli coming from the environment, thus causing a number of efferent responses according to its structure and evolutionary morphology. The organism does not interact with the outside world itself, but with a series of affine signs that are related to it and that lead it to perform specific actions. Uexküll called this *Funktionkreis*, or "functional circle", a concept which Uexküll illustrates by the example of the tick:

"Now let us place the tick into the functional cycle as subject and the mammal as its object. It is seen that three functional cycles take place […] The mammal's skin glands comprise the feature carriers of the first cycle, since the stimulus of the butyric acid sets off certain perception signs in the [tick's] perception organ, and these signs are transposed outward as olfactory features. The processes in the perception organ bring about corresponding impulses by induction in the [tick`s] effect organ which then bring about the releasing of the legs and falling. The falling tick imparts to the mammal's hairs, on which it lands, the effect mark 'collision', which then activates a tactile feature which, in its turn, extinguishes the olfactory feature 'butyric acid'. The new feature activates the tick's running about, until this feature is in turn extinguished at the first bare path of the skin by the feature 'warmth', and the drilling can begin[18]."

Uexküll uses the tick as an example to argue that there is not the same reality perceived equally by all different types of organisms. In the case of the tick, its perceived reality is constrained by the number of perceived stimuli, which are, at the same time, *Merkmalträger*, that is, bearers of meaning. These stimuli are access vectors to an external reality and represent the only relationship that binds the tick to the outside world, out of which nothing exists. The reality presented to other living organisms will differ from the tick's reality depending on the number of access vectors they have, which will be determined by the set of genetic predispositions as the result of evolutionary patterns that have preceded the organism itself. In accordance with Uexküll, what we refer to the external world is nothing more than the result of the interaction of our own genetic predispositions with those signs or signals that allow us to intervene with our environment. Each organism has its owns, and thus a different spectrum of perception and meaning.

Uexküll's thesis constituted a paradigm shift in the study of subjectivity, denying the legitimacy of a world or reality outside of subjective experiences. At the same

[18] Uexküll, J. von, *A Foray into the Worlds of Animals and Humans: With a Theory of Meaning*, Minneapolis, University of Minnesota Press, 2010, p. 50.

time, this functional circle conditions the organism to perceive its environment through its receptor organs, which function as translators of meaning. Thus, the functional circle of each organism constitutes its own world, cohabiting with the rest of organisms in isolation within its own reality, whose totality is constructed within the limits of its functional circle. Everything that coexists in the sphere of a surrounding world is transformed and modified until it becomes the bearer of useable meaning or, in the opposite case, it is totally abandoned.

After Uexküll's contributions, Konrad Lorenz was the first to postulate the existence of a cognitive subconscious through which learning becomes possible. Lorenz called this sunbsconscious a "ratiomorphic system", a term borrowed from Egon Brunswik[19], which was described as a set of innate knowledge that allows us to acquire new ones from the surrounding environment. This ratiomorphic system does not operate on logical or rational criteria, since it is a subconscious process, but nevertheless it carries out a large number of cognitive functions that condition our perception of the world.

Lorenz retrieves Kantian postulates by assuming that a kind of knowledge *prior to* experience is necessary in living organisms that makes possible the adaptation of necessary laws to ensure their survival. Kant's *a priori* judgements, as Lorenz maintains, are *a posteriori* from the evolutionary point of view, that is, empirical products of the mechanism of knowledge acquisition, mechanisms of survival that have been introduced in reason by the evolution of this ratiomorphic apparatus. As Lorenz quotes: "One must realize that this conception of the a priori as an organ means the destruction of the concept: something that has evolved in evolutionary adaptation to the laws of the natural external world has evolved a posteriori in a certain sense, even if in a way entirely different from that of abstraction or deduction from previous experience[20]".

The Constructivism in the Twentieth Century: The Impact of Second-Order Cybernetics

Among all the disciplines that contributed to the consolidation of Constructivism as a genuine epistemology, Cybernetics deserves special attention due to the introduction of new models of analysis that configured the new paradigm of the scientific revolution in the twentieth century. Heinz von Foerster, a central figure

[19] Brunswick, W., "Ratiomorphic models of perception and thinking", *Acta Psychologica: 11*, 1955, pp. 108-109.
[20] Lorenz, K., "Kant's Doctrine of the A Priori in the Light of Contemporary Biology", *Philosophy after Darwin: Classic and Contemporary Readings*, Princeton, Princeton University Press, 2009, pp. 231-232.

in the development of the theory of Radical Constructivism and Second-order Cybernetics, developed a new theory of knowledge where not only the system is studied but also the observer as part of the own system: "A brain is required to write a theory of a brain. From this follows that a theory of the brain[21]". Foerster's contributions derived in the configuration of a Second-order reality, an inner reality in which there are not exist the entities, but also the attributions as to the meaning and value of these ones. Seen in this way, we live in a constructed reality that surprisingly enables us to carry out specific decisions and actions.

Another of the most relevant representatives whose contributions went a step further in the development of Radical Constructivism was the German philosopher and theoretician Ernst von Glasersfeld. To the definition provided by Foerster, Glasersfeld adds: "Knowledge can now be seen as something which the organism builds up in the attempt to order the as such amorphous flow of experience by establishing repeatable experiences and relatively reliable relations between them. The possibilities of constructing such an order are determined and perpetually constrained by the preceding steps in the construction[22]". For Glasersfeld, the world we experience is automatically constructed by ourselves because we do not notice how we perform that act of construction. Glasersfeld argues that the relationship between knowledge and reality is held to an adaptation or adjustment in a functional sense: "The concepts of variation and (natural) selection, taken from Darwin's theory of evolution, opened the possibility of substituting the notion of adaptedness for the philosophers' traditional notion of truth as a correct, or at least approximately correct, representation of objective reality[23]". Then, "just the environment places constraints on the living organism (biological structure) and eliminates all variants that in some way transgress the limits within which they are possible or 'viable', so the experiential world […] constitutes the testing ground for our ideas (cognitive structures)[24]". For Glasersfeld, the theory of evolution provides an adequate analogy for the relationship between cognitive structures with the world of the subject's experience[25].

In relation to the notion of biological adaptation, Glasersfeld also adopts some proposals embedded in the genetic epistemology developed by Jean Piaget, for

[21] Foerster, H. von, *Understanding Understanding: Essays on Cybernetics and Cognition*, New York, Springer-Verlag, 2003, p. 289.

[22] Glasersfeld, E. von, *Introduction to Radical Constructivism*, *op. cit.*, p. 36.

[23] Glasersfeld, E. von, *Radical Constructivism: A Way of Knowing and Learning*, London, Routledge Falmer, 1995, p. 50.

[24] Glasersfeld, E. von, *Introduction to Radical Constructivism*, *op. cit.*, p. 23.

[25] It should be mentioned that the epistemological content of the analogy proposed by Glasersfeld refers to Uexküll's biological ideas, for whom every organism determines its environment by virtue of its genetic predispositions.

whom the main function of human cognition is not to depict a reliable representation of an ontological reality, but it serve as an adaptive instrument in the world of experience. Thus, the biological adaptation does not consist of preserve a reliable image of reality, but safeguarding a plausible image of the world that allows the organism to adapt successfully.

Glasersfeld's proposal supposed a rupture with the traditional view with the traditional theory of knowledge and turned epistemology into an examination of how intelligence operates to configure a relatively stable image of the world from experience. At this point, Glasersfeld goes a step further than Vico, for whom this explanation becomes superfluous, since if the reality experienced is constructed by ourselves it is logical to suppose that it maintains some stability. In Glasersfeld words: "The human activity of knowing cannot lead to a certain and true picture of the world but only to conjectural interpretation[26]". For Glasersfeld, all cognitive activity implies a teleological character, that is, a purpose that contributes to configure a regularity in the experiential world. The cognizer puts into relation a new experience with one previously experienced to determine its conceptual character. The similarity or difference between these two experiences is a result from the operations carried out by the cognizer, so it can never be explained as a condition of an objective reality. In other words, the criteria used by the cognizer to establish similarity or difference are constructed within his field of perception and, under no circumstances, can be attributed to a world independent of the observer.

Conclusion

The historical curve drawn by the interdisciplinary convergence of this current of thought consolidated Constructivism as an emerging paradigm in the field of science and philosophy. The cognizer's knowledge is generated through the active and subjective construction of ideas and concepts in a continuous interaction between the observer and the observed, so reality is not something that can be perceived objectively, but it is constructed subjectively. The act of perception does not give us a mirror image of what is outside, just a configuration of a mental world delimited by our cognitive reach.

However, Constructivism introduces some epistemological problem. If reality is the result of the cognitive construction, should not there be as many realities as individuals? And, how can it explain the constitution of common realities that

[26] Glasersfeld, E. von, *Introduction to Radical Constructivism*, *op. cit.*, p. 31.

delimit the acceptable boundaries of coexistence in society? On the other hand, if reality varies from individual to individual, the language that each one uses to describe that reality should also change, would not this be an impediment to communication? It is also important to mention the role of scientific method in this new paradigm. If scientific assertions acquire a supracultural status, is scientific method a way to unify realities?

The future of this multidisciplinary research may provide some clarity to the aforementioned questions. However, the fact that the human brain plays a leading role in configuring how we perceive reality should make us particularly skeptical of what we believe, especially given that skepticism is the cornerstone of philosophical and scientific progress. To call into question our beliefs and what we perceive as "reality" will allow us to advance intellectually in our compression of the world and ourselves.

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DOI: http://dx.doi.org/10.15366/bp2018.18.003
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