

Farewell to Objectivity¹

Abstract. The paper is focused on one of the major contributions Heinz von Foerster has made to epistemology and the philosophy of science. It traces earlier disagreements with the traditional theory of knowledge and sketches the history to which von Foerster's interpretation of the principle of undifferentiated coding supplied a decisive final chapter.

To the generation that lives through them, changes in the environment, social revolutions, and the breakdown of concepts that formed the basis of a world view, always seem to be deeper and vastly more portentous than all the earlier upheavals history has recorded. Nevertheless I would say that during the eight decades that Heinz von Foerster has so far witnessed, more traditional beliefs were superseded and new perspectives opened than ever before. And among the pioneers who initiated new ways of thinking he deserves a prominent place. This becomes clear above all if one considers the intimate domain where each thinker chooses how he or she should view that treasury of facts, notions, and fixed points that we call knowledge.

The very act of knowing has become questionable in our time. There have, of course, been individual questioners in other centuries who tried to move in the direction that now seems inevitable, but their attempts were brushed aside by the momentum of philosophical tradition and their writings remain *curiosa* at the margins of the history of ideas. Heinz von Foerster did not start as a philosopher but as a physicist with an uncommon interest in the processes of thinking. His epistemological ideas did not spring from quietly reading ancient authors but from his scientist's intuition and his experiences with people in a rather turbulent world. It would take a meticulous biographer to map von Foerster's intellectual itinerary. Instead, I shall try to show that his constructivist theory of knowledge can be substantiated also by snippets from the history of philosophy.

The conceptual revolution that has shaken the 20th century is more profound than the one initiated by Copernicus, who dislocated the human being from the cherished position at the hub of the universe. But even if mankind was relegated to an insignificant minor planet, it could still maintain the belief that it represented the crowning achievement of God's creation and that the human mind towered over everything else because it was able to perceive and understand God's work, at least in

¹ Revised and expanded version of *Abschied von der Objektivität*, in P. Watzlawick & P. Krieg (Eds.), *Das Auge des Betrachters*. Munich: Piper, 1991.

its great lines. The 20th century has shown this belief to be illusory. Whatever the stuff is that we call knowledge, it can no longer be considered a picture or representation of an experiencer-independent world. Heinz von Foerster has said this with consummate elegance and precision: "Objectivity is the delusion that observations could be made without an observer."

This is not just a quip. Like many other brilliant formulations with which Heinz von Foerster has directed the development of cybernetics, this one is not only an effective slogan but also the expression of a practical consequence of the drastic remodeling that the last hundred years have brought about in a variety of sciences. The diverse "breakthroughs" are of course well understood by the specialists in the disciplines where they have happened. But so far only a handful of thinkers have begun to appreciate the collective weight of the implicit conceptual changes.

A Long Track of Dissent

The general view of the activity of knowing, the knowledge it produces, and the theory of knowledge that is to describe how it works is by and large still conditioned by the age-old belief that what we come to know is there before we know it. It is seen as a process of discovery. As long as we imagine it in this fashion, we inevitably slip into some form of realism that hinges on the belief that we could "recognize" things as they are, as though experiencing and cognizing had no significant influence on what we come to know.

Once one has understood that perceptions and observations do not drift like snowflakes into a passive receiver but are the result of actions carried out by an active subject, one cannot but wonder what precisely these actions are and how they work. That the active subject and the nature of its rational equipment are relevant, is not a novel idea ("ratio," after all, means relation). Protagoras, in the 5th century B.C., already explained that man is the measure of all things and determines *that* they are and *how* they are (Diels, 1957, p.122). Socrates, in Plato's dialog *Theaetetus*, takes the opposite position and declares that what is perceived must be there as perceivable beforehand (*Theaetetus*, Line 160). The mainstream of Western philosophy has always interpreted this in the realistic vein and insisted that the results of perception and observation have to be images of things that exist in themselves, independently of the human subject. But throughout history Protagoras, too, has found followers.

If I mention some of these dissenters who did not agree with the conventional wisdom of philosophy, it is not to show that the present revolution merely warms up old ideas and does not offer anything new. In my view, this would be a wrong interpretation. Rather, I want to document that a more relativistic point of view which, at the time of the pre-Socratics, some thinkers adopted on the grounds of intuition and informal logic, has been bolstered up by additional arguments in the course of history and, during last hundred years, by unexpected "empirical" findings in the sciences.

Although the history of ideas can hardly be considered to have run along an orderly linear path, it is possible to isolate some details which, in retrospect, can be seen as a development.

Before Protagoras, Xenophanes had already remarked that even if a human mind succeeded in visualizing the world as it really is, that mind would have no way of knowing that it had done so (Diels, 1957, p.20). This paradox bedevils all those who would like to assume that our knowledge can reflect a world that is independent of the knower. George Berkeley characterized the situation when he said that we can compare ideas only with other ideas but never with what they are supposed to represent (Berkeley, 1710, I §8). There is no logical way around this impasse and all the philosophers of the West, having acknowledged it more or less explicitly, side-stepped into metaphysics. That is to say, they tried to gain knowledge of a real world by means that are not accessible to reason.

Different Views of Knowledge

The sceptics barricaded themselves behind the logically irrefutable assertion that it is impossible to acquire certain knowledge about reality. By this stubborn denial, however, they merely contributed to the traditional conviction that the concept of knowledge could not be put in question. They also made themselves unpopular because at all times it was quite clear that there are kinds of knowledge which we simply have to trust. Whether you are a sceptic or a realist, you are constantly drawing conclusions from your experience which you cannot afford to doubt in the conduct of daily living. If you consider that this knowledge can hardly be imported ready-made from an external world, it becomes clear that it must in some way be constructed. This conclusion inevitably raises the question how reason can succeed to produce usable knowledge. This is the topic on which I have collected some outstanding remarks.

The Irish mystic John Scottus Eriugena, who rose to fame in the 9th century A.D., wrote a few lines that could serve as epigram for today's radical constructivism:

For just as the wise artist produces his art from himself in himself and foresees in it the things he has to make ... so the intellect brought forth from itself and in itself its reason, in which it foreknows and causally pre-creates all things it desires to make. (Eriugena, quoted in Moran, 1985, p.102)

Eriugena's work was placed on the Vatican's Index almost as soon as it was published. Hence it is unlikely that either Vico or Kant had read it. But this is irrelevant, because both these philosophers would have arrived at Eriugena's conclusion along the path of their own thinking.

Vico summarized the notion of cognitive self-organization in the principle that God knew the world because it was He who had created it; humans, similarly, could know what they themselves have made, but not the world that was God's creation (Vico, 1710, Ch.7 §3). Vico also noted that when we speak of "facts," we literally refer to something that has been made, because the word *factum* is the past participle of the Latin verb *facere*.

In Vico's view, we ourselves have constructed the things with which we furnish our experiential world. Beginning with the concept of point, we build up shapes, and with the concept of unit we generate numbers (*ibid.* Ch.1, §1). All this and what follows from it is the work of human imagination, a term he uses in the original sense of creating images. Human science, he suggests, is simply "the endeavor to bring things into agreeable relations" (*ibid.* Ch.7 §3). He frequently refers to mathematics as an

operative science, and I therefore feel justified in interpreting the “agreeableness” of relations as a matter of smoothness, simplicity, and elegance.

Vico does not explicitly trace all the steps of the reasoning that led him to his theory of knowledge. It was Kant, half a century later, who made the analysis of reason a major objective. He methodically and logically dissociated the activity of knowing from the notion of discovering a pre-existing reality. In the preface to the 2nd edition of his *Critique of pure reason* he states his own version of Eriugena’s intuition:

Reason can comprehend only what she herself brings forth according to her design. Following the principles of her judgments she must proceed towards lasting laws and compel Nature to reply to her questions, rather than allow herself to be led, as it were, on a leash. (Kant, 1787, B:XIII)

Later, in the course of his analysis of concepts, Kant expands this in a way that anticipates one of the corner-stones of radical constructivism. He picks up a suggestion first made by David Hume and concludes that all relations, be they consciously grasped or not, are the result of our acts of understanding. He explains:

...we cannot represent anything connected to an object, unless we ourselves have made the connection, and among all representations the representation of a *connection* is the only one that is not given by the object, but can be achieved only by the subject itself because it is the result of its own activity. (*ibid.* B:130)

Two things must be made clear in this quotation. First, when Kant speaks of connection (*conjunctio*), he includes every kind of relating and joining our thinking can accomplish. It covers not only the composition of objects out of single sensory properties, but also the mutual coordination of the composite objects, the perceiving or visualizing of spatial arrangements or temporal successions, and the relating of one experience to another. In short, every kind of linkage we use in order to build up concepts and conceptual structures. Consequently, everything that, on the grounds of some analysis, is considered a composite, everything to which we attribute “structure,” is the product of our own capability to present things to ourselves. This is the implicit conceptual basis for von Foerster’s “construction of realities.”

The second point concerns an aspect of Kant’s formulation that is likely to mislead unwary readers. A connection, he wrote, is the only representation that cannot be given by the object. This has been taken to imply that there are properties and thus a form of particular existence that could be ascribed to the object and through it to the “thing in itself.” But this cannot be what Kant had in mind. He explicitly says that we cannot think of anything connected with an object, unless we ourselves have made the connection. Indeed, the object, insofar as it consists of more than one sensory perception, arises in the act of our representation and must not be thought of as preformed in any way. The “thing in itself,” therefore, is a construct (Kant calls it a heuristic fiction) which we can project into “reality” (i.e. the *ontic* world) only after we have conceptually composed it.

Today, this Kantian insight is particularly relevant when we come to Piaget and read: "l'objet se laisse faire" (the Object allows itself to be treated) (Piaget, 1970, p.64). In this regard, Piaget's Genetic Epistemology is in full agreement with Kant: the child must first conceptually construct an object before it can begin consciously to act upon it.

In *The child's construction of reality* (1937), Piaget provides a fairly detailed developmental model of how children may construct objects and consider them as "permanent" furniture in their experiential world. Neither Kant nor Piaget, however, asked what formal logical procedure could yield such a fundamental result. In one of his seminal papers, Heinz von Foerster proposed a mathematical model that opens a path in this direction. It shows how the permanence of objects may arise as "eigenvalue" from the recursion of experiences each of which is but a fleeting partial reconstruction of a preceding one (von Foerster, 1976).

Continuing the report on dissenters who stepped out of the philosophical tradition and relinquished the dogmatic belief that knowledge must in some way represent an independent ontology, I want to mention Hermann von Helmholtz, one of the most successful scientists of the 19th century. In a postscript to his famous paper on the notion of conservation that became a corner-stone

of the "First principle of thermodynamics," he added some twenty years later that he had come to realize that the notion of causality "is in fact nothing but the presupposition of lawfulness in all appearances of nature" (Helmholtz, 1881). A full exposition of this point can be found in his posthumously published papers:

Compared to other hypotheses concerning laws of nature, the causal law is in the following respects an exception: (1) It is the prerequisite for the validity of all others. (2) It gives us the only possibility to grasp something that has not yet been observed. (3) It is the necessary basis for goal-directed behavior. (4) The natural mechanics of connecting our representations leads us towards it. Hence we have the strongest motives to wish that the law of causation be correct; it is the foundation of all thinking and behaving. (Koenigsberger, 1902, p.247)

These four points are a somewhat expanded reformulation of the approach to causality that David Hume had taken in the 18th century. Kant reports that it was Hume's ideas that shook him out of a dogmatic slumber. While most philosophers and scientists of the 18th century slumbered on, Helmholtz took both Hume's and Kant's analyses to heart. In a famous lecture on perception, he expounded not only Kant's view that the specific character of our sensory organs determines our sensory impressions, but also the more fundamental idea that space and time are inherent in the conceptual functioning of our reason rather than in the real world (Helmholtz, 1878).

Taken seriously, this brings about a radical shift in our conception of all knowledge, including the knowledge we call scientific and consider more reliable than any other. If space and time are imposed by us as the coordinates that serve to order and systematize experience, then we have no way of representing to ourselves anything that lies outside the domain of our experience. What appears as pattern to us, as sequence of events, as structure of any kind, simply disintegrates and becomes unthinkable if we take away the spatial and temporal coordinates. What we call

knowledge, therefore, cannot possibly be a picture or representation of a reality that has not undergone the transformation of being experienced.

I want to emphasize that this change of view in no way diminishes the importance of knowledge. Its meaning and its value are replaced by a meaning and a value that are indeed more vital. Instead of the supposed correspondence with an unfathomable reality, it is the service knowledge renders that can now be seen as its testable justification. As Humberto Maturana has said, to know means to act effectively (Maturana, 1980, p.53). To this I add as a complement: Knowledge means to understand. In both the domain of action and the domain of thought, we actively endeavor to fit elements into sequences that we can use as models to gain and to maintain an equilibrium. On the one side, the structures we compose consist of sensorimotor elements, on the other they consist of concepts—and since our concepts usually have roots in sensorimotor experience, the two domains are nearly always intermingled.

In the field of cybernetics, the term “model” has a special meaning. In everyday language it usually refers either to a kind of prototype, a master design according to which something has to be built, or to a replica made in another material or a different size. In cybernetics it is a construct intended to function more or less like an item whose dynamic structure one cannot examine or copy. We have this second sense in mind when we say that our knowledge is made up of conceptual models that enable us to orient ourselves in the experiential world, to foresee situations, and sometimes even to determine experiences.

From this premise we come to the “radical” conclusion that the role of knowledge is not to reflect an objective reality but to empower us to act effectively in the world of our experience, which is to say, to act so that we achieve a goal we have chosen. Hence the constructivist axiom that knowledge must *fit* reality but does not represent.

At first sight it might seem that this modification of the concept of knowledge, though it might require changing an idea here and there, does not drastically alter the accustomed picture of the world. One could think, for instance, that a theory found to fit the world need not be an exact picture, but since it fits it must in some sense reflect that world. This, however, would be a false conclusion. The judgment that a theory fits is always based on the observation that it has been appropriate in its actual applications.² It is a judgment drawn from experiences and not from encounters with things in themselves. Besides, it is always relative to specific goals and limited to instances in the past. And the way we see and know experience is determined by the properties of our reason which, as Kant said, “can comprehend only what she herself brings forth according to her design.”

² This is, indeed, the implication of Popper’s proposal to substitute falsification for the conventional notion of verification that is logically unattainable (cf. *Conjectures and refutations*, London: Kegan Paul, 1962). For an exposition of the differences between constructivism and Popper’s critical realism see my *Radical constructivism: A way of knowing and learning*, London: Falmer Press, 1995.

Recent Developments

For science and the philosophy of science the constructivist redefinition of the concept of knowing entails a radical shift that would never have been considered had science itself not opened perspectives and produced facts that were no longer compatible with the traditional theory of knowledge.

As early as the 1930s, prominent physicists left no doubt in their writings that the theory of relativity and quantum mechanics had led to findings that seemed incompatible with the notion of science as a search for objective truth. But this did not immediately change the accepted picture of the world. As Gotthard Günther remarked in 1958:

Modern Philosophy has so far made little effort to acknowledge the downright world-shaking consequences of the contemporary scientific situation. (Günther, 1958, p.9)

This delay in coming to terms with new conceptions in other disciplines is characteristic not only of philosophy. The study of perception, which is a very lively branch of psychology, is divided into subsections, each of which focuses on a specific sensory modality. The psychologists who concentrate on visual experience, rarely take note of the work of their colleagues in the auditory domain. In that branch, there is a respectable literature on a phenomenon called "the cocktail party effect." To experience this effect, one does not need a laboratory. As the name suggests, it happens at mundane events such as cocktail parties. While you are listening to someone's rather tedious account of a trivial experience, you suddenly become aware that a more interesting conversation is going on behind you. You shift your attention to the voices at your back and follow the bore's tale just enough to be able to utter a polite noise whenever he or she pauses.—The fascinating feature in this event is the fact that you are able to switch your attention from one stimulus to another, without any "objective" change in the stimuli. This contradicts the naive stimulus theory according to which attention is guided by conditions in the environment. As I discussed at some length in another context, a similar effect has been observed in the visual domain. We are able to move the focus of attention in the visual field without moving our eyes (Glaserfeld, 1981). Yet, although this spectacular finding was independently reported thirty years ago by prominent experimentalists, it has not yet had the slightest impact on the passive model of perception that is generally presented by psychologists and philosophers.

An even more powerful argument for the contention that it is the subject that actively constructs what it perceives was put forth by Heinz von Foerster when he formulated the "Principle of undifferentiated coding" that applies to all perception:

The response of a nerve cell does *not* encode the physical nature of the agents that caused its response. Encoded is only "how much" at this point on my body, but not "what." (Foerster, 1973, p.38)

Because it has been known at least since Johannes Müller mentioned it in 1838, textbooks on perception, especially those that take into account the experimental history of the field, occasionally state the fact that neural signals do not indicate the quality of the stimulus. To my knowledge Heinz von Foerster was the first to draw

attention to its epistemological implications. It is, of course, more comfortable to perpetuate the myth that our senses provide us with “information” that tells us what the world is like, rather than to ask how it comes about that we perceive it the way we do.

Today, research into cognition has become a wide-spread enterprise and it is somewhat depressing to see that most of it proceeds from a model of perception that has long ago been revealed as untenable. The constructivist orientation, launched by Piaget in the 1930s and greatly enhanced and put on a much wider scientific basis by the work of Heinz von Foerster, still meets a great deal of resistance. In recent years, however, a change of attitude has begun to emerge. That the pursuit of objectivity in the ontological sense is a delusion, has been confirmed by studies in the relatively new discipline of sociology of science and the conceptual paradoxes that have come to the surface in quantum physics have shaken several philosophers of science out of their dogmatic slumber. They no longer see the goal of science as the unveiling of the universe but rather as the invention of models that allow us to cope with the problems presented by our experience (Rorty, 1982)

The concept of knowledge is thus actually changing. Traditional philosophy was forever searching for timeless truths that would be independent of the thinking subject. With the spreading of the Kantian insight that what we rationally grasp is always what human reason builds up according to its own rules, interest has been growing in *how* this building-up proceeds. And this is the area in which we celebrate Heinz von Foerster as a pioneer. There can be no final answers in this area but only models that, for the time being, satisfy our demands. Hence he reminds us that the responsibility for the world we conceptually construct and enact rests with us. Since the task of human thinkers can no longer be to understand a world that God has made, they may at last begin to work towards a viable equilibrium in the world that they experience.

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