Science and Human Normativity[1]

Claude Debru

Ecole normale supérieure
45 rue d'Ulm
Paris F–75005, France
e-mail: claude.debru@ens.fr

Abstract: *In this broad and synthetic paper, science is pictured as an expression of human normativity, which means the power of creating new facts and ideas according to certain rules. Moral philosophy (Korsgaard), phenomenology (Husserl), historical epistemology (Bachelard, Canguilhem), and medical philosophy (Goldstein, Canguilhem) are discussed. In the end, we ask the question of the role of logical norms in science, following some remarks by Schrödinger.*

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The term 'normativity' has become highly popular in recent years in moral philosophy all over the world. Normativity means the human power of defining, establishing, and more profoundly, of changing norms – norms of thinking and norms of action. Norms and values are ideas of things which should be the case or ought to be the case, rather than ideas of existing things. This is a very puzzling function of human mind that we are able to think about things which should be the case, and not only about things which exist as a matter of fact. This point was very nicely made by the American moral philosopher Christine Korsgaard in her classical book *The Sources of Normativity*:

> *It is the most striking fact about human life that we have values. We think of ways that things could be better, more perfect, and so of course different, than they are. Why should this be so? Where do we get these ideas that outstrip the world of experience and seem to call it into question* […]*? Clearly we do not get them from experience* […] *And it*

[1] I am very grateful to the Baltic Association and especially to Peeter Müürsepp for having agreed to put this presentation on such a broad topic as science and human normativity on the programme of the conference. I will deal with this theme in a very classical way.

> *is puzzling too that these ideas of a world different from our own call out to us, telling us that things should be like them rather than the way they are, and that we should make them so.* (Korsgaard, 1996, p. 1)

According to Korsgaard, and to many other philosophers, the fact of value remains a mystery. In this article, I will deal with science as an expression of human normativity in the sense that science creates new ideas and new objects according to certain rules which are themselves parts of this creation – so that the reflection on science is part of the scientific process itself. The real issue here is – do these rules change? Do we create new rules of the scientific game? Obviously, yes. The study of this change is what we call 'historical epistemology' – which played a great role in the late nineteenth- and twentieth-century philosophy at many times. The most important founders of historical epistemology were Ernst Mach with his well-known history of mechanics, and Edmund Husserl who had some ideas about the normative power of scientific mind in his writings related to the crisis of European science and about the origin of geometry. Philosophically speaking, Husserl emphasized the normative and ideal character of science which is very clear at the beginning of science in Ancient Greece. A corollary of this idea was the historical character of scientific concepts and theories – which was recognized and much studied by other philosophers like Gaston Bachelard in France at about the same time. So let us speak first about norms, and second about history.

Husserl asked the question: What makes the scientific discourse so unique? He addressed this question again in very peculiar circumstances. In May 1935, he gave a lecture at the Kulturbund in Vienna. The lecture was published with the title *The Crisis of European Mankind and Philosophy*. The historical circumstances of this lecture should be recalled. Husserl suffered from prosecutions in Nazi Germany and had the feeling that any action of him would have an adverse effect on international cooperation. He was reluctant to accept any foreign invitation, but in the end he went to Prague and to Vienna. In his Vienna lecture, he defined the European idea of mankind as the idea of an intellectual and practical development put under the control of normative ideas.

> *Mankind, considered in its soul, has never been and will never be accomplished. The spiritual goal (telos) of European mankind* […] *is situated at the infinite: it is an infinite idea towards which the spiritual becoming as a whole seeks, if I may say, to transcend itself... Consciousness* […] *erects (this term) in a new form of development, put under the control of norms, of normative ideas.* (Husserl, 1950, p. 236)

Husserl thus developed the idea of mankind as a telos, as a normative idea governing future developments. He thought that this idea was deeply linked to the birth of philosophy and science as a new type of intellectual creation in Greece. He was certainly Eurocentric in that respect, but we can understand that given the circumstances.

Husserl is one of the last representatives of German idealism. According to him, "what scientific activity creates or generates is not real but ideal; better, what is generated in this way with its value and its truth becomes immediately the matter of a possible creation of ideals (or idealities) at a higher level" (Husserl, 1950, p. 238) – and this process goes on indefinitely. Mathematics, of course, is the major example of this infinite normative intellectual process. "With mathematics, man has for the first time discovered infinite tasks. This will be, for all subsequent periods, the star which will guide the course of the sciences" (Husserl, 1950, p. 240). Husserl considers mathematics as an ideal construction which goes on indefinitely and which is guided by norms. In 1936, he wrote a text devoted to the origins of geometry which belongs to the group of texts on the crisis of European sciences and transcendental phenomenology. He developed the idea of geometry as the description of finite objects which are considered within the horizon of an open infinity. Within this horizon, each new intellectual object or result becomes the tool for discovering new objects and new results. This process is pictured by Husserl as a historical process, as a process which belongs to the essence of mankind itself as historical process, a process in which everything is historical, as Husserl stresses it – in the particular sense that every new intellectual creation helps to revive the original sense or sense formation of the first intellectual creations.

So here we can understand in which original sense, according to Husserl, in a way which is deeply rooted in his idealism, science is a historical process in which tradition and creation are deeply linked to each other. This is the reason why, according to Husserl, who is fighting against purely positivistic theories of science, the dogma of a gap between epistemology and history should be strongly criticized and abandoned. In this way, and within his own idealism, Husserl began to define the programme which was later called 'historical epistemology' and developed in a less idealistic and more positivistic form by Gaston Bachelard in France and later on by Thomas Kuhn in the United States.

Now, if we go back to normativity, which means the power of creating and changing norms, we may find a slightly different meaning of normativity in a biological and medical context. In the first half of the twentieth century in Germany, the fields of philosophy of medicine and of theoretical medicine were created and

developed by a whole school of different thinkers. The most prominent ones were Kurt Goldstein and Viktor von Weizsäcker. They developed a theory of the organism as a whole – a whole endowed with properties of regulations which allowed it to adjust to various circumstances, including pathology, and so to keep some sort of vital value. The idea of life as a value taken in a more biological and medical sense met philosophical developments about values, which may be summarized in the following statement by Reininger: "*Unser Weltbild is immer ein Wertbild*" (Our worldview is always at the same time a picture of values; cf. Canguilhem, 1972, p. 117). These kinds of ideas were received, deepened, and broadened by a French philosopher of medicine, Georges Canguilhem, who in his MD thesis in 1943 made some strong statements: "Life is polarity and as such unconscious position of value." With the term polarity he meant a dynamic polarity between the organism and its environment. "Life is in fact a normative activity […] In the full sense of that word, normative is what sets up norms. In this sense, we propose to speak of a biological normativity." (Canguilhem, 1972, p. 77) This property of normativity has quite an extension, since, according to Goldstein and to Canguilhem, pathological states are still endowed with some kind of normative power. The organism strives to reorganize itself in order to keep going in spite of major defects. This is a deep insight from a physiological standpoint.

An immediate consequence of this idea is that the organism may function on norms different than its usual ones. In physiology, the limits between the normal and the pathological may be extremely flexible, as a consequence of individual variation. For instance, people can live very long and normal lives with quite high blood pressure. At least some people can. The physicians say that the norm for blood pressure is about 130/80, with some variation, of course. And they give you drugs in order to decrease or increase your own blood pressure so that you adjust to that norm. Medicine plays with the organism's original normativity – but according to Canguilhem, instead of defining norms, medicine should recognize the organism's own normative power rather than trying to define an objective science of pathology – which does not exist since, according to him pathology is only a matter of subjectivity (a rather radical thesis). It is easy to observe that these kinds of ideas had and still have an influence in some parts of medicine. Anyway, people like Goldstein and Canguilhem made clear that normativity has a biological and physiological content before having a psychological and social one.

This being said, my purpose now is to go back to the problem of normativity in science, since we just recognized that in physiology and in medicine normativity is mostly the power of modifying or restoring norms. Does such a property of

changing norms apply to science? In other words, do epistemological norms and values change – and to which extent do they change? This is a subject of historical epistemology. However, the classical answers given by the founders of the field such as Gaston Bachelard and Thomas Kuhn are perhaps not sufficient. Bachelard proposed the concept of 'epistemological rupture' which designates the process by which a given field of enquiry acquires a true scientific character. A well-known example of that is the case of Mendelian genetics as pictured by Canguilhem. In 1865, Mendel made the new hypothesis of discrete genetical characters, certainly the best hypothesis to interpret his own results. This is an extremely well-known example of an 'epistemological rupture' at the foundation of a new scientific field, but this is certainly not an example of major changes in epistemological norms or epistemic values – although such changes do certainly exist. Thomas Kuhn's concept of scientific revolutions and paradigm changes is certainly closer to that aim of identifying major changes in epistemological norms. More recently, there were many discussions on epistemic values like simplicity, coherence, non-contradiction, etc. Are there still intellectual norms in science? Or are there only social norms governing the process of scientific production? This is a real question, which was also faced by Thomas Kuhn and by others after him. There are certainly intellectual norms, but they became much more flexible after major events like the development of quantum mechanics, and internal developments of logic. An open question remains: Is logic still normative for science? In this respect, I will rather make some comments on earlier developments of quantum mechanics and their logical and philosophical aspects, and take as an example Erwin Schrödinger's discussions in some of his more popular lectures.

Schrödinger was perfectly aware of the almost contradictory character of quantum mechanics. In his Nobel lecture in 1933, he tried to explain the fundamental ideas of wave mechanics, and he was ready to recognize that conceptual difficulties were at the bottom. Old concepts like real and purely possible (real and possible trajectories) should be strongly qualified. Schrödinger pictured the difference between the ordinary point mechanics and the new wave mechanics as a logical one. In ordinary mechanics, the 'either–or' logic is an absolute rule. In wave mechanics, mutual exclusion is no more the case. Things could be at the same time something and something else quite different as well. This is the logic of 'as well as'–'*sowohl als Auch*', which is quite peculiar to quantum mechanics (Schrödinger, 1967, p. 99). Schrödinger was ready to admit this kind of logic without too much trouble. Like his colleagues, he was deeply puzzled by the wave/particle dilemma about the nature of reality. He asked a deep question: What is real, '*Was ist wirklich?*', and in the end he became quite sceptical about

the physicist's ability to capture reality by mental images. Anyway, between the 'either–or' logic and the 'as well as' logic, Schrödinger, at the end of his Nobel lecture, did not want to choose, and he fancied that only in extreme cases like the experimental ones, nature had to show only one aspect at the same time. Nowadays, the logical situation of quantum mechanics is much worse. The so-called Greenberger-Horne-Zeilinger paradox is a straight contradiction to ordinary logic (Balian, 2009, p. 66). Does this mean that logic is no more normative? Or could logic be extended in directions like quantum probabilities which could help to go beyond these difficulties, if not really overcome them? If this would be the case, would that mean that we would be able to create new norms? Norms with extended validity which would be lawful for a while – but only for a while? Would this mean that in the end we would be forced to accept relativism? Or to become sceptics like Schrödinger in his old age? To recognize that human normativity has its own limits? To admit that human normativity, instead of reflecting the order of nature, is only a social construction – a theory which became quite popular in recent years? Is this only a matter of taste? And which are the arguments? These are the many questions.

Let us go back to historical epistemology, and to the evolution of epistemological norms. Throughout centuries, logic was normative for natural science. The best example of that is certainly Kant's *Critique of Pure Reason*, which is a fixed system of conceptual structures and of intuitive spatio-temporal structures. We do not live in such a world anymore, even if we continue to teach it. We became able to understand that new norms are required by new sciences, and that sciences are not driven by epistemological norms, but by experiments and by conceptual innovation. The recent debates on epistemic values (values rather than norms, which makes them less compulsory, values like coherence, simplicity, etc.) has shown that even the strength of these values has been questioned. Complexity dominates the landscape of contemporary science, and scientists (mostly computer scientists) have to be extremely creative to devise new tools in order to cope with the increasing complexity. The neurophysiologist Alain Berthoz (2009) recently coined a new word, 'simplexity', to designate this state of affairs, this mixture of structural complexity and functional simplicity. Coherence is much more difficut to apply in a world which is characterized by a plurality of reality levels, every level having some kind of autonomy, which is quite clear in biology and in social sciences. This raises the question of the most appropriate description of contemporary science. Philosophers from earlier generations, who emphasized the role of human normativity in the progress of science, like Husserl, Bachelard, Canguilhem, and others, were deeply rationalists. They were rationalists precisely in the sense that they thought that unreal things like

norms and values should become real, that things which ought to be the case would become real thanks to individual or collective action. Canguilhem, of course, based his own philosophy of normativity on some physiological, and thus naturalistic, grounds. Presently, cognitive neuroscientists are more and more interested in the problem of the sources of human normativity, which they study at the level of child development. This kind of study is performed at the Max Planck Institute of Evolutionary Anthropology headed by Michael Tomasello in Leipzig. For instance, children at the age of two are able to understand the rules of game and to react when these rules are not obeyed (Rakoczy *et al.*, 2008). Norms are very likely the products of both innate dispositions and social constraints, which makes sociological relativism not really, or not entirely, true.

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