Thinking technological and biological beings: Gilbert Simondon's philosophy of machines*

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Resumo

Este trabalho tem como objetivo investigar as contribuições de G. Simondon para o campo de estudos de Ciência e Tecnologia. Distanciando-se das contribuições da cibernética, Simondon propõe investigar os processos de individuação, desenvolvimento e evolução da tecnologia. No enfoque da filosofia das máquinas proposto por esse autor, os objetos técnicos são contextualizados tanto sincrônica quanto diacronicamente. Destacamos que, diferentemente de outros enfoques teóricos a respeito deste tema, o interesse do autor centra-se no determinismo energético que se manifesta dentro e fora dos objetos técnicos. Desse modo, concluimos apontando as contribuições desse enfoque teórico para os estudos contemporâneos a respeito da história dos experimentos científicos.

Palavras-chave: Filosofia das máquinas. Processos de individuação. Objetos técnicos.

Pensando os seres tecnológicos e biológicos: a filosofia das máquinas de Gilbert Simondon

Abstract

The article proposes an investigation of the contributions of G. Simondon in the studies of Science and Technology. Leaving the contributions of cybernetics behind, Simondon investigates the processes of individuation, development and evolution of technology. According to his philosophy of machines, technical objects are contextualized both synchronically and diachronically. In contrast with other theoretical approaches of this problem, we emphasize that the interest of this author lies in the energetic determinism that is manifested in and outside technical objects. At last, we point out the contributions of this theoretical approach to contemporary studies on the history of scientific experiments.

Keywords: Philosophy of machines. Processes of individuation. Technical objects.

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Introduction

In his famous lecture of 1947 entitled “Machine and organism”, the French philosopher and historian of science Georges Canguilhem argued for a biological philosophy of technology. Instead of continuing to reduce organisms to machines, Canguilhem suggested taking the historical fact of on-going machine constructions as a starting point, and sought to explain this fact by making reference to the structures and functions of organisms. In this perspective, technology was clearly more than some secondary result of scientific activity. To Canguilhem, it testified to an irreducible, biologically grounded mode of activity: an activity that does not build upon science, but rather accompanies it as an equal partner. Accordingly, science and technology were seen as standing in permanent reciprocal relationships, in which each partner would, at different times, adopt the respective partner’s solutions and problems (CANGUILHEM, 1992).

In post war France, Canguilhem’s lecture (first published in 1952) could be read as taking issue with the research agenda put forth by cybernetics. In 1948, Norbert Wiener’s book *Cybernetics or Control and Communication in the Animal and the Machine* was first published by the Paris-based Hermann Press and later by Wiley in New York (WIENER, 1948). French scholars such as Claude Lévi-Strauss and Jacques Lacan welcomed cybernetics with great enthusiasm as a foundation for all human and social sciences (LACAN, 1978; LÉVI-STRAUSS, 1951). However, in the French context, there were skeptical voices as well. In particular, Raymond Ruyer, professor at the Faculté des Lettres of Nancy University and proponent of what he called a “neo-finalist” psycho-biology, argued against some of Wiener’s basic assumptions, especially the latter’s narrow notion of information. Thus, Ruyer claimed for example: “A machine is communicating or using information, it does not create it” (RUYER, 1952, 1954). In his publications, Canguilhem made reference to Ruyer, but he also drew on a whole tradition of technological knowledge, ranging from Charles Darwin and Karl Marx to Ernst Kapp and Franz Borkenau. In addition, Canguilhem quoted André Tetry, a biologist working on the use of tools in the animal kingdom, as well as André Leroi-Gourhan, the Bergson-inspired archaeologist and ethnographer of technology. At the end of his lecture, Canguilhem presented “bionics” instead of “cybernetics” as a promising research program. In his view, one could only arrive at innovative models and analogies for machine construction, if one studied the structure and function of biological systems. Several years later, Canguilhem’s line of argument was taken up, modified and further developed by philosopher and psychologist Gilbert Simondon (1924-1989).

Simondon took up his studies at Ecole Normale Supérieure and Sorbonne University in 1944. Besides Canguilhem, Martial Guérolt and Maurice Merleau-Ponty count as his teachers. Heavily interested in contemporary science, Simondon was attracted by cybernetics, but he also offered some critical reflections on the topic. In 1958, he presented the main part of his PhD thesis, *L’individu à la lumière des notions de forme et d’information*. This part was published in two sections: the first in 1964, the second as late as 1989 (SIMONDON, 1964, 1989a).

In these two books, Simondon unfolds a comprehensive theory of individuation processes in physical, biological, psychological and social systems, synthesizing *Gestalt* psychology, information theory, and topological models into a unique mixture that, according to Gilles Deleuze, lies the foundations for "a whole philosophy" (DELEUZE, 2004). In 1963, Simondon was elected to the chair of psychology at Sorbonne University. Shortly thereafter, he started directing a laboratory for general psychology and technology at the Rue Serpente in Paris. He died in 1989 (CANEGHEM, 1989).

In 1958, Simondon had published a book, based on the so-called *thèse complémentaire* that accompanied his work on the problem of individuation. The title of this additional thesis was *Du mode d'existence des objets techniques*, i.e. "On the mode of existence of technological objects" (SIMONDON, 1989b). It reflects the philosophical approach of the book: Simondon argues that although we live in a world saturated by technology, we still have difficulties in understanding the "essence" of technology, the ontological status of technological objects. In Simondon's eyes, this status cannot be deduced from the mode of existence of other objects – e.g. aesthetic, religious or natural. Rather, it had to be inferred from well-chosen examples, descriptions and comparative analyses. According to Simondon, cybernetics had failed to go in this direction. Wiener had the "huge merit" of having started the first inductive investigation into machines and established cybernetics as a comprehensive, interdisciplinary research project. But, as Simondon pointed out, Wiener had failed in defining his research object appropriately. Cybernetics only focused on a specific type of machine, i.e., machines with feedback mechanisms. More generally, Simondon stated: "Right from the start, [cybernetics], has accepted what every theory of technology must refuse: a classification of technological objects according to pre-established criteria and following genera and species" (SIMONDON, 1989b, p. 48). For Simondon, the problem did not consist in comparing technological and biological beings or applying biological conceptions to technology and vice versa. His point was that Wiener had made the wrong biological choice, relying on a stable, quasi-Linnean classification. What Simondon was after was a dynamic theory of technology, i.e. a theory that would grasp technological objects in their development and their relation to inner and outer milieus or *Umwelten*. In other words, *Du mode d'existence des objets techniques* did not mean to start another botany of machines, rather it dealt with the individuation, development and evolution of technology.

Approaching the technological object and its becoming

Simondon's book is divided into three parts. The first section deals with the creation and evolution of technological objects, the second with the relations of human beings to technology, taking historical as well as contemporary interactions into account. The third part is devoted to the essence of what he calls "technicity", i.e. the technological way of being-in-the-world, in comparison with both religious and philosophical world-relations that involve important ethical questions. By today's standards, Simondon's book appears to be written in a rather unconventional style. It contains only few quotations, footnotes and references, and one of its more obvious goals is to inaugurate an appropriate philosophical language for meeting the challenge of technology. He was a philosopher of concepts, not of subjectivity: an approach that is evident in the first part of his book.[1]

In contrast to more conventional theories of technology, Simondon's reflections on the emergence and evolution of technological objects do not start with simple tools. Simondon is not interested in quasi-archaic components of technology that might then develop into machines or other more complex technological objects. The concrete examples he discusses in the first section of his book are complex and contemporary: motorcycle motors, electronic tubes, and the telephone. Closely focusing on the structure and development of such objects, the disposition of their inner parts and the corresponding processes of interaction and exchange, Simondon isolates the process of "concretization" as a key feature of technological development. Simondon offers empirical evidence for this process by means of photographs showing personal collections of such machines and machine parts. With respect to the 4-stroke combustion engine, he argues that its various components come closer over time, while certain parts get functionally "overdetermined." Thus, at a certain point, the cooling fins on the cylinder function no longer only thermically but also statically: they cool the cylinder at the same time as they give it additional stability. Simondon offers another example: in the development of electronic tubes, the passive components of this object became reduced, whereas its active parts were condensed. The rubber base grows smaller and eventually disappears. At the same time, the functional parts of the tube start to take ever more space within the glass ampoule. With respect to such series of objects, Simondon speaks explicitly about the "morphological evolution" of technological objects. At the same time, he relies on a visual strategy invented in late 18th century embryology and later used in Darwinism (although not by Darwin himself) (RATCLIFF, 1999; HOPWOOD, 2000).

The process Simondon calls "concretization" has to be distinguished from the adaptation of technological objects to human needs. Taking the telephone as an example, Simondon shows that this object was shaped in a manner evocative of concretization: the rest or cradle came nearer to the dial. But this exterior change, he argues, did not correspond to any essential change within the object: its interior remains largely stable. Thus, he concludes, authentic concretization consists in "a convergence of functions within a structural unity" (SIMONDON, 1989b, p. 23). In a technological object that is still abstract, i.e. which only starts to develop, the parts are functionally related in such a manner that, "like workers, they cooperate without knowing exactly what the others are actually doing" (SIMONDON, 1989b, p. 21). They work one after the other, sometimes even against each other. According to Simondon, the concretized technological object is "no longer fighting with itself, no secondary effect infers with the function of its totality or remains outside of it" (SIMONDON, 1989b, p. 34).

Simondon's theory of concretization highlights some important features of his theory of technology. First, it becomes obvious that his concept of the "technological object" does not refer to single beings, but to a series or row of such beings. In other words, Simondon is interested in the "individuality" of technological objects, not in their "singularity". As he explains, this individuality is linked to a "pure functional scheme", a diagram representing the invention of an object and at the same time implying guidelines for its construction. It is important to understand that Simondon's concept of the technological object refers to the diagram or scheme "and" its material manifestations that, step by step, concretize the technological object. Therefore it is not a question of single technical devices such as those we have at home or as we might encounter in museums. What Simondons calls an "object" is a series or, as he terms it, a lineage, a "unity of becoming" (SIMONDON, 1989b, p. 20).

Moreover, the process of concretization reflects some of Simondon's interests in Biology. As other historians and philosophers of technology, Simondon uses terms and visual strategies from the biological sciences. However, this use also serves to set the essence of technological objects from the essence of natural objects apart, such as plants and animals. Simondon understands natural objects as completely concretized objects: all functional parts are "overdetermined in them". In contrast, the technological objects is subject to concretization, but it always keeps, as Simondon explains, a remainder of abstraction. It never reaches complete concreteness. With respect to human beings, Simondon stresses that man is in fact inventing technological objects; but at the same time he underscores that invention does not equal scientific practice. To a certain degree, a newly invented object always remains "opaque" to science, since it is the realization of effects or moments which cannot (yet) be fully explained. The new technological object is something that realizes a hitherto unknown performance (SIMONDON, 1989b, p. 46; 2005). At this point, one can summarize the coordinates for determining the specific mode of existence of technological objects. As Simondon puts it: "Concretization gives to the technological object an intermediate position between natural objects and scientific representations" (SIMONDON, 1989b, p. 46). To put it differently: the technological object is not a living being. But it is an individual.

Technology and the "*Umwelt*"

There are other aspects in Simondon's work that display certain affinities to Biology. Initially, Simondon focuses on the emergence and development of individual technological objects. However, he does not underestimate the fact that this emergence and development is not playing out in a vacuum, but in more or less specific environments. With respect to the relation between technological object and technological reality he distinguishes "hypertely" (where objects such as gliders depend in their functioning upon specific technological arrangements) from "mixed hypertely" (where the technological object, e.g. a locomotive, only works at the intersection between two kinds of surroundings, in this case technological and geographical *Umwelten*) (SIMONDON, 1989b, p. 50). Furthermore, he deals with "self-conditioned surroundings" characterized by the insertion of technological objects in stable contexts that are required and in a way produced by the object itself. (Here, he points to the water turbine as a key example.) (SIMONDON, 1989b, p. 54).[2]

The conceptual details Simondon adds to his notion of the technological object reinforce his interest in relations between technology and *Umwelten*. As a consequence, he introduces differences between “technological elements”, “technological individuals” and “technological totalities”, or “ensembles”. Individuals correspond to machines, devices, and engines; technological elements are best thought of as machine components or simple tools; technological ensembles are vast installations consisting of a variety of machines, devices, and engines, e.g. factories or laboratories. This terminology allows Simondon to analyze in more detail the relationship between the technological object and its surroundings. The presence of mixed hypertely, for example, is characteristic for technological individuals, whereas technological ensembles function as surroundings where machines and engines have to be isolated from one another in order to work properly. In addition, this terminology leads to some general statements about the developing reality of technology. As was already pointed out, the emergence and evolution of technological objects does not reflect, in Simondon’s eyes, a continuous growth of scientific knowledge or engineering expertise. Rather, it is marked by inventions that introduce discontinuities into the historical record. Also, the transmission of what societies have achieved technologically, i.e., their “technicity”, does not follow a linear succession. For Simondon, it describes a wave-like line (SIMONDOM, 1989b, p. 66; PARADIS, 1994).

The elements are decisive for technological traditions. They have the capacity to store technicity in material form and to transmit it from one period to the other. As Simondon puts it, the elements have “transductive” properties, “like seeds which transport the characteristics of a species and allow new individuals to be born” (SIMONDON, 1989b, p. 73). Therefore, the time form characteristic for technological realities is marked by longer periods of relative stability and shorter periods of change. Elements are produced in ensembles (factories, for example). The elements thus emerging compose individuals that, at a later point, enter again into an ensemble. In other words, changed elements need time to have effects on ensembles.

Conclusion

The machine philosophy of Gilbert Simondon did not become as seminal as Wiener’s cybernetics. However, references to Simondon’s book on technological objects can be found in the writings of authors such as Herbert Marcuse, Jean Baudrillard, Gilles Deleuze, Félix Guattari, Bruno Latour, Bernard Stiegler, Sanford Kwinter, and Mark Hansen. Today, there is a growing interest and secondary literature on his more general philosophical writings. With respect to the history of science and, in particular, the history of scientific experimentation there are at least two aspects in Simondon’s theory of technological objects that are of interest. Both reflect the fact that Simondon elaborated a set of rather sophisticated concepts for dealing with technological beings. At the same time, they result from his critical dialogue with biological knowledge. The first of them concerns the relation of technological objects to their inner and outer surroundings. Simondon pushes us to open the "black box" of machines in two directions. First, in view of the inner components or elements of machines and their dynamic co-evolution; second, with respect to the assemblage of technological individuals within larger totalities or ensembles. In a striking passage of his book, Simondon describes a laboratory of sense physiology. In a first step, he draws fine distinctions between the material and the functional borders of physiological instruments. In a second move, he addresses the problematic spatial distribution of these machines: technological individuals that often tend to interfere with one another. (SIMONDON, 1989b, p. 61). However, Simondon contextualizes technological objects and their surroundings not just in synchronic manner but also diachronically. This is the second point of interest here. As already shown, for Simondon, the individuality of technological objects lies in their respective functional diagram and a series of corresponding material concretizations. In other words, technological objects never stand alone. They are always part of a row constituted by earlier and later instances of related objects. One might add here that Simondon's interest in the serial being of objects is shared by art historians such as Henri Foçillon and George Kubler as well as some historians of science (e.g., Hans-Jörg Rheinberger). However, in Simondon's work the series of forms and their material manifestations do not concern questions of exterior design, but the interior necessities of individual technological objects – not their logic but, as one could say, their physiology. In other words, Simondon is interested in the material and energetic agency that manifests itself inside and outside of technological objects. And he sketches a methodology that might prove very fruitful if we are to further explore this sort of agency in future studies concerning the history of scientific experimentation. It is the changing "Shape of Experiment" that Simondon puts on our research agenda.

Notas

[1] I am alluding to an important distinction made by the late Michel Foucault here. See his "Introduction" to Georges Canguilhem, *The normal and the pathological*, Dordrecht: Reidel, 1978, pp. ix-xx.

[2] It would be very interesting to compare this analysis with Heidegger's reflections on the hydroelectric plant in the Rhine River.

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