Self-Organizing Life: Michel Serres and the Problem of Meaning

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Abstract

Within continental philosophy of biology the work of Michel Serres has not received a lot of attention. Nonetheless, this chapter wants to argue that Serres was part of a group of thinkers – together with Jacques Monod and Henri Atlan – that started to think about biology in terms of second-order cybernetics and information theory. Therefore, this chapter aims to do four things. First of all, it maps the relation between Serres and Canguilhem, one that was mediated by authors such as Louis Althusser or Jacques Monod. Secondly, it fleshes out Serres's own 'biophilosophy'. I label this alternative tradition as a 'biophilosophy without a subject'. Finally, this chapter explores the consequences of this alternative biophilosophy through a brief examination of two authors whose work lies in line of this tradition: René Girard and Bruno Latour. Though at first sight different, they both draw inspiration from this biophilosophy to develop a framework that, paradoxically, 'jumps over' the subject. Hence, the reason why biology is not a prominent theme in neither Girard's or Latour's work. This is not because of a lack of biophilosophy, but because of an implicit one: a biophilosophy without a subject.

Keywords: Michel Serres, Georges Canguilhem, Jacques Monod, Henri Atlan, René Girard, Bruno Latour

> « L'important était de signaler que la nouvelle biologie, en cherchant l'Inde, avait trouvé l'Amérique »[1]
>
> "Maybe that Brillouin, the information physicist, is more of a philosopher than Jean-Paul Sartre."[2]

1. Introduction

Philosophy of biology in French philosophy has been mainly linked with the work of Georges Canguilhem (Méthot 2020, this volume), or authors linked to his work, such as Henri Bergson, Gilbert Simondon or Jean Gayon. This chapters wants to focus on one of Canguilhem's students, who is often forgotten: Michel Serres. A student of Canguilhem whose work was not primarily focused on biology, Serres nevertheless wrote several texts on how his more general ideas would shed a new light on biological matters.

Specifically, this chapter will do four things. First of all, it maps the relation between Serres and Canguilhem, one that was mediated by authors such as Louis Althusser or Jacques Monod (section 2). Secondly, it fleshes out Serres's own 'biophilosophy' (section 3). Whereas a philosophy of biology applies certain philosophical insights to the field of biology, a

[1] (Morin 1973, 28)
[2] (Latour 1987, 84)

biophilosophy rather uses insights from the life sciences to reconceptualize one's philosophical worldview. My claim is that Serres endorses a different biophilosophy than Canguilhem. He builds this alternative on insights from information theory, inspired by Léon Brillouin, Jacques Monod and Henri Atlan. I will label this alternative tradition as a 'biophilosophy without a subject'. Finally, this chapter explores the consequences of this alternative biophilosophy through a brief examination of two authors whose work lies in line of this tradition: René Girard and Bruno Latour (section 4). Though at first sight different, they both draw inspiration from this biophilosophy without a subject to develop a framework that, paradoxically, 'jumps over' the subject. Hence, the reason also why biology is not a prominent theme in neither Girard's or Latour's work. This is not because of a lack of biophilosophy, but because of an implicit one: a biophilosophy without a subject.

2. Serres and Canguilhem

Michel Serres (1930-2019) was a French philosopher, originally trained in mathematics. After finishing his *agrégation* in philosophy in 1955, he received his doctorate in philosophy 1968 at the Sorbonne. With Jean Hyppolite and Georges Canguilhem as supervisors, his main thesis was *Le Système de Leibniz et ses modèles mathématiques* (1968) and his minor thesis *Epistémologie de l'interférence*.[3]

As his dissertations indicate, Serres's main occupation was not biology, but formal questions concerning structure and information. Nonetheless, Serres saw biology as one of the fields in which this novel approach took shape. But he identified this new biophilosophy not with Canguilhem, but with the new molecular biology, embodied by Jacques Monod and François Jacob.[4] For their contributions to molecular biology Monod and Jacob, together with Lwoff, would indeed get their Nobel Prize in 1965 and in 1970 they would publish their philosophical treatises: Monod's *Le hasard et la nécessité* (1970) and Jacob's *La logique du vivant* (1970). Serres would write extensive and enthusiastic reviews of these books, expanding on his own biophilosophy as well.[5]

Serres invokes molecular biology against Canguilhem. In a later interview with Latour, Serres would recall how "biochemists understood rapidly that their own revolution would come, after information theory, from the questions posed in Schrödinger's *What Is Life?* and in France from Monod and Jacob's discoveries. Now, that was certainly not what epistemology was teaching about biology."[6] To which Latour replied that French epistemologists only concerned themselves with "cells and the reflex arc", allusions to Canguilhem.[7] Though Serres adds that these are "perfectly respectable things" that we should "at least preserve in our memory" but that are, nonetheless, "things which, at the time, became abruptly outdated. Once again the epistemologists didn't follow."[8] In another interview, Serres recounts his failure to arrange a meeting between Canguilhem and Monod:

> I even tried to introduce Monod to Canguilhem, who was after all the philosopher of the life sciences. Except that the paradigm he supported dated from the physiology of the

[3] See Serres (1972).
[4] See Debru, Morange and Worms (2012), Erdur (2018).
[5] See Serres (1974a).
[6] (Serres and Latour 1995, 12)
[7] (Canguilhem 1952, 1955)
[8] (Serres and Latour 1995, 12)

> 1940s. He had no idea what biochemistry could entail, let alone the genetic code, nor that one would soon consider deducing the totality of a living being from the DNA algorithm! He was in the past and Monod in the future. I tend to think he made me pay for this paradigm break. It must be said that such an epistemological bifurcation was difficult to swallow for a man who had dominated the discipline for so long. Anyway, he didn't want to meet Monod after all.[9]

In contrast, Serres saw his own earlier encounter with Monod as a greater success:

> A gentleman came to me at the end of one of my classes to say, 'This is what brings me here. I took a lot of philosophy courses to find a philosopher that I would take as an advisor, because I wrote a little book that I wanted to have reread. I sighed but hey, I accepted. The man gave me his manuscript titled *Le Hasard et le nécessité*! It was Jacques Monod.[10]

Serres adds that he and Monod, from that day on, "became very good friends. He introduced me to a small circle that met at his home, a club spell where we met beautiful heads: René Thom, François Jacob, Marco Schützenberger and a few others."[11]

However, such a picture is too one-sided. For Canguilhem did engage with molecular biology.[12] For instance, he wrote a review of Jacob's *La logique du vivant*,[13] and in his archives one can find notes on Jacob's and Monod's books.[14] Canguilhem even invited Lwoff, Jacob and Monod for a seminar on 17 June 1971, where he presented them with a set of questions focusing on the epistemological and philosophical dimension of their work.

Many commentators have argued that there was a certain antagonism between Canguilhem and molecular biology.[15] In his notes on Monod, Canguilhem was very critical and concluded that Monod's conceptual apparatus did not add anything that was not already found in Kant.[16] Similarly, Talcott argues that "[t]he stunning success of post-war molecular biology presented a major challenge to Canguilhem"[17] and Morange concludes that "his philosophy of life, inspired by a form of holism, opposed itself to that of the molecular biologists" and that "Canguilhem was not a keen and insightful observer of developments in molecular biology".[18]

On the other hand, Loison (2018) claims that if you look at the texts Canguilhem published on molecular biology, the latter actually enthusiastically saw molecular biology as a revival of Aristotelianism: "There is in the living a *logos*, inscribed, preserved and transmitted".[19] According to Loison, this enthusiasm faded after 1970, when Canguilhem read Jacob's *La logique du vivant*, where the latter took distance from a too easy equation between DNA and language. We can thus conclude that, contrary to what Serres suggests, Canguilhem did not

[9] (Serres 2014, 50)
[10] (Serres 2014, 49)
[11] (Serres 2014, 49)
[12] See Morange (2000), Talcott (2014), Loison (2018), Erdur (2018).
[13] (Canguilhem 1971)
[14] (Loison 2018, 277)
[15] E.g. Morange (2000) and Talcott (2014).
[16] (Loison 2018, 278)
[17] (Talcott 2014, 263)
[18] (Morange 2000, 85, 91)
[19] (Canguilhem 1966, 221)

ignore molecular biology. Why then did Serres feel the need to draw such a dichotomy? I will explore at least three reasons: a biographical, a political and a philosophical one.

2.1. SERRES AS AN ISOLATED PHILOSOPHER

The biographical reason refers to Serres's personal break with Canguilhem. Whereas in his doctoral thesis Serres still praises Canguilhem, the doctoral defense itself turned out to be a breaking point. Serres later recounted how something went wrong, though he refused to go into the specifics. "Let's say there was a tragic moment in my personal and academic history that I don't like to talk about. Until then, Canguilhem had taken me under his wing. I was his favorite student of sorts. He got mad at me that day."[20]

Though hard to reconstruct, there are indications that Canguilhem found Serres's self-presentation rather arrogant. Serres did not sufficiently acknowledge his debt to French epistemology, in particular to Gaston Bachelard. Serres indeed published a critical text on Bachelard in 1970, distancing himself from French epistemology.[21] Evidence for Canguilhem's disapproval is found in *Idéologie et rationalité dans l'histoire des sciences de la vie* (1977), where Serres is mentioned as one of the two recent challenges to French epistemology. The first one comes from Dominique Lecourt (1969), also a student of Canguilhem and follower of Althusser (see below). The second challenge was Serres: "Another young epistemologist, Michel Serres, raises a different objection. The history of science, he says, does not exist".[22] Canguilhem refers to Serres (1974b), in which the latter argued that a general history of science has not been written so far, since it first required a critical history of classifications.[23] Canguilhem is skeptical, since for him the project already exists as the 'regional rationalism' in Bachelard's *Rationalisme appliqué* (1949) Canguilhem concludes "that Bachelardian epistemology confronted this problem well before anyone had thought of accusing historians of ignoring it."[24]

On his turn, Serres felt himself isolated from philosophers in France. Instead of getting a position in philosophy, Serres ended up in a history of science department: "I found myself banned from philosophy" and "had to teach outside of my profession. I used to have five hundred people in my philosophy class, and at one time I only had a handful from history of science".[25] In a similar vein, Serres reported how "Claude Lévi-Strauss and François Jacob wanted me to join the Collège de France because they liked what I was doing", an effort which failed because "the philosophers opposed it".[26] In the end, Serres and Canguilhem only met again in 1995, just a few months before Canguilhem's death: "He just asked me at the end if I had had a lot of PhD students in my life. I replied: You know, sir, that I never had one since I was not in my discipline. I was teary-eyed ... and so was he."[27]

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[20] (Serres 2014, 49)
[21] (Simons 2019)
[22] (Canguilhem 1988, 18)
[23] This project that Serres (1974b) invokes is mainly inspired by his reading of Auguste Comte and the problem of classification: if we classify all the sciences, where must be place this act of classification itself? Is it itself a scientific act, thus implying another science to be added to the classification, an act that requires another act of classification, etc. Or it is something outside of science, rather inspired by politics or culture? (see Simons 2022, chapter 1).
24 (Canguilhem 1988, 18)
25 (Serres 2014, 51)
26 (Serres 2014, 54)
[27] (Serres 2014, 51)

2.2. SERRES AND ALTHUSSERIANISM

The second, political reason for Serres's strong dichotomy has to do with the political context in France in the 1960s. The main authority at the ENS when Serres was studying was Althusserianism. Serres was unconformable with how, what he saw as exciting new scientific developments, such as molecular biology, were dismissed as ideological by the Althusserians. Moreover, they did so, following Althusser, by invoking the authority of Bachelard, arguing for an 'epistemological break' between science and ideology (see Simons 2018).

Biology was often one of the main objects of these debates, where Althusserians neatly tried to separate the scientific from the ideological. One example is the infamous Lysenko affair which raged at that time, and dismissed genetics as a 'bourgeois' science, in opposition to Lysenkoism which was a 'proletarian science'. In the Soviet-Union opponents were dismissed, imprisoned or even executed, while Lysenkoism became the official state-endorsed biology. Communist parties in other countries soon endorsed this new party line. As Serres reported, the consequences were often horrible, even in philosophy departments:

> I also remember a guy in my class, biologist or zoologist - well, a brilliant guy - who committed suicide after a well-watered dinner during which one of the guests, who was both a professor at the Sorbonne and a member of the Communist Party central committee, had explained to him at length that the 'proletarian biology' of Michurin and Lysenko - which he taught, however - was in fact a fraud from a scientific point of view. This is the atmosphere of the *Ecole Normale* at that time, with the blessing of Althusser. (Serres 2014, 38)

Neither Althusser nor Canguilhem explicitly endorsed Lysenkoism, but left room to criticize and problematize it. For instance, they encouraged Lecourt to write a study on the social history of the whole episode.[28] Lecourt later recounted:

> Canguilhem, like Jacques Monod who slammed the door with a crash, distanced himself from the Communist Party he had rubbed shoulders with during the Resistance. It was the occasion of a real break-up about which he happened to speak to me angrily twenty years later. No more than Monod, he could not accept this intellectual swindle which wrongly directed all the attention towards the Lamarkian notion of inheritance of acquired characters. As a science historian, Canguilhem saw this as a real regression.[29]

But while Lecourt aligns Canguilhem and Monod, Serres again has the tendency to separate them. Though Canguilhem and Althusser might have distanced themselves from Lysenko, in the eyes of Serres it was too little, too late. Serres saw in Monod and Jacob a more clear and swift response to Lysenko. Already in 1948 Monod wrote an article in the newspaper *Combat*: "La Victoire de Lyssenko n'a aucun caractère scientifique". Jacob would similarly oppose Lysenkoism, later claiming that his decision to focus on genetics was a product of this opposition.[30]

A second clash between Monod and Althusser happened in the 1960s. In 1967, Monod was elected to the faculty of the Collège de France. In his inaugural lecture he gave a first rough sketch of what would later become *Le hasard et la nécessité* (1970). That same year, Althusser

[28] (Lecourt 1976).
[29] (Lecourt 2016, 138-139)
[30] (e.g. Jacob 1981, 36; 1987, 234).

was organizing a lecture series for a 'course in philosophy for scientists'. Though not originally planned, Althusser took advantage of this lecture series to comment on Monod.

As recent scholarship has made clear, Althusser was actually very positive about Monod.[31] Althusser described Monod's lecture as "an exceptional document, of an unparalleled scientific quality and intellectual honesty"[32] and saw in Monod an ally to rethink dialectical materialism. But the problem was Monod's subsequent step, when Monod extrapolated from biology the world of ideas, language, history and ethics. Monod ends his plea with the claim that 'language created man', something that Althusser saw as "idealist".[33] Althusser thus invoked the Bachelardian epistemological break against Monod, by showing where the scientist leaves science and enters ideology. In the case of Monod, this was his illegitimate move to ''arbitrarily impose upon another science which possesses a real object, different from that of the first, the materialist content of the first science''.[34] Soon other Althusserians would repeat this dismissal of Monod.[35]

In his own review of Monod's *Le Hasard et la nécessité,* Serres responded to this accusation. According to Serres, there are only two ways to meaningfully define idealism. Either idealism entails a mathematical idealism, in the Platonic sense, or an idealism of the subject, where "the world is nothing but my representation".[36] Serres dismisses the second type of idealism: "A century and a half of critique has shown, I believe definitely, that it was nothing but a mythology."[37] Since a focus on the subject or on representation is absent in Monod's work, he is not part of this subjective idealism. Hence, his idealism must be of the first Platonic type, where the ideas have an objective existence, outside of the subject. In Monod's case these ideas can be materially situated: "Monod knows *where* its invariant form is: it is written on the DNA tape. Finally, genetics was one of the first sciences to relativize, once and for all, the activity of the individual subject."[38]

The opposition created by Serres between Canguilhem and Monod thus had biographical and political reasons. However, there is also a third, philosophical reason for this opposition. Rather than contextual, this reason has to do with the content of molecular biology and the effect it should have on philosophy: For Serres, Canguilhem did not really take the genuine revolutionary character of molecular biology into account.

3. Another biophilosophy is possible

Serres never developed an extensive philosophy of biology. Biology is rather an exemplary domain of a larger reconceptualization of philosophy and science. In his early writings, Serres captures this revolution under the banner of a 'new new scientific spirit' (*nouveau nouvel ésprit scientifique*), alluding to Bachelard's *Le nouvel ésprit scientifique* (1934).[39] The new wave of sciences Serres had in mind were (second-order) cybernetics and information theory, and their effects on subfields in physics, chemistry and biology (ranging from chaos theory to molecular

[31] (Turchetto 2009; Tirard 2012)
[32] (Althusser 1990, 145)
[33] (Althusser 1990, 150)
[34] (Althusser 1990, 151)
[35] (Pêcheux and Fichant 1969)
[36] (Serres 1974a, 55).
[37] (Serres 1974a, 55)
[38] (Serres 1974a, 56)
[39] (Simons 2019)

biology). For Serres, this new new scientific spirit had four characteristics: a new ontology, a new place for epistemology, a new classification of the sciences, and new role for the philosopher.

3.1. The new new scientific spirit

First of all, the new new scientific spirit implies a radically different ontology. Starting from information theory, Serres suggests that in these new sciences all worldly processes are interpreted as exchanges of information. Originally, information theory concerned engineering problems. In the case of Claude Shannon, for instance, it was about telephone communication: how to think about the fidelity of messages transported by telephone lines? Shannon (1948) breaks up this problem in three subproblems. First of all there is the *technical problem* about how accurate a message can be transmitted. Secondly, there is the *semantic problem*, which deals with the question whether the transmitted message conveys the desired meaning. Finally, there is the *effectiveness problem*, dealing with how effective the received message affects conduct.

Information theorists like Shannon mainly understood information in relation to noise, i.e. unwanted and undesired disturbances of the message one is trying to convey. Communication is understood as a struggle against noise. Hence the importance of the medium that guarantees the fidelity of the message. This was typically captured through the terms such as *robustness* and *redundancy*: the manner in which a system was still able to convey the message, even if there were disturbances in the medium, for instance by making sure that there are multiple ways to do it. This central point can also be found in Serres's early work, in the form of the 'excluded third' (*le tiers exclu*): "To hold a dialogue is to suppose a third man and to seek to exclude him; a successful communication is the exclusion of the third man".[40]

But within this informational framework, information exchange is not restricted to human communication, but refers to all material and biological interactions. The picture that follows from this is a world interpreted as one giant network of communication:

> There is a constant and continuous dialogue between things which form the historical fabric of events and laws, among whom my intervention is exceptional […] The general informational language is the fundamental and continuous relation between objects. Even before their deciphering, the certainty that it exists induces the certainty that the external world exists, in the mode of a communicating network, of which all the networks I know and could constitute are singular, exceptional cases, approximating to imitate the real world.[41]

For this claim, Serres's draws on the French physicist Léon Brillouin (1889-1969). Brillouin wrote on the new science of information theory, works that deeply inspired Serres.[42] For Serres, Brillouin is, therefore, also exemplary for the second characteristic: the new place for epistemology.

French epistemologists, such as Bachelard, had argued that the norms of science were produced intrinsic to the scientific practices. The task of the epistemologist was not so much to impose certain external norms on scientific practices, but make the implicit norms explicit. Serres goes

[40] (Serres 1969, 41)
[41] (Serres 1972, 110)
[42] (Brillouin 1956)

one step further: not only are scientific practices 'auto-normative', but they also produce their own explicit epistemology. This is what Serres finds in the work of Brillouin:

> the theory of information has constituted a philosophy of physics, intrinsic to the discipline itself. It is remarkable, for instance, that Brillouin has chosen as the title of his last work: *Science and Information Theory*. One finds in this work, indeed, a complete, descriptive, quantified, normative and founding epistemology, expressed in the language of physics itself, of the notion and practice of experimentation, scientific laws, precision and approximate knowledge, the limits of knowledge (what can I know?), in short all the classical topics; and all the 'modern' ones: a theory of codes, language, writing and translation. Philosophers need neither look for nor write a handbook of the epistemology of experimental knowledge: it is found here.[43]

To understand these claims, let us have a look at Brillouin's work. Brillouin mainly defines information as "a function of the ratio of the number of possible answers before and after" (Brillouin 1956, x). When we say that information increases, this means that the number of possible answers to the initial question decrease. For example, if we are wondering where our friend is and we enter his room and we see a hot cup of tea, we say that this is more informative than if we would enter a room without the hot tea. Why? Because the hot tea narrows down the number of possible scenarios: the tea indicates that someone is likely in the neighborhood.

This example, moreover, also highlights the link between information and entropy. In defining information in this manner, Brillouin aimed for a "generalization of the second principle of thermodynamics":[44]

> Every physical system is incompletely defined. We only know the values of some macroscopic variables and we are unable to specify the exact positions and velocities of all the molecules contained in a system. We have only scanty, partial information on the system, and most of the information on the detailed structure is missing. Entropy measures the lack of information; it gives us the total amount of missing information on the ultramicroscopic structure of the system.[45]

Brillouin defined information as negative entropy, or what he would call: negentropy (Brillouin 1956, vii). In this way information theory can provide a solution to an infamous thought experiment proposed by J. C. Maxwell in 1867, now known as Maxwell's demon. According to Maxwell the second law of thermodynamics was seemingly violated when you imagine a demon controlling a trapdoor between two chambers filled with gas. If we imagine that the demon has the capacity to open the door when fast particles approach while keeping it shut in the case of slower ones, the demon seems to be capable to decrease entropy in a closed system, thus violating the second law. Brillouin's solution is to apply information theory to the actions of the demon, which have their own informational cost (and thus show that the system is not really closed). The demon uses energy to manipulate the door, but more importantly, also produce information about the whereabouts of the approaching particles. This information itself can only be gained by spending energy.

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[43] (Serres 1974a, 45)
[44] (Brillouin 1956, xii)
[45] (Brillouin 1956, xii)

It is here that the new new scientific spirit becomes self-reflexive. Brillouin applies this framework not only to physical systems, but also to the practice of experimentation: doing an experiment is itself a matter of creating information by spending energy outside of the experimental set-up. In other words, information theory offers us a framework to understand scientific research as an negentropic activity. In this sense, Serres can concludes that information theory carries its own epistemology: "What is experimentation in general, if not an informational as well as an energy balance of the laboratory?"[46]

But, according to Serres, this applies to the molecular biology of Monod as well, whose work embodies the "new new biological spirit".[47] Monod's work similarly carries its own epistemology in itself:

> No critic has yet noticed that biochemists, and Monod especially, have a 'natural philosophy' intrinsic to their scientific activity. […] Monod, it is true, sometimes refers to the great names of the academic pantheon, such as Descartes, Kant, Hegel; but the efficient operators of his work are not the tools forged in and by this tradition. These are new tools, dating from around this century, and which you will find in [Norbert] Wiener, [Percy] Bridgmann, [Erwin] Schrödinger and [Léon] Brillouin […]. And the philosophy of physics is information theory. And so, when a biochemist announces that he is writing a natural philosophy, it clearly means that he is applying the theory of information (the natural philosophy of natural philosophy) to his own discipline.[48]

Not only are biological organisms are understood as information processing machines - exchanging information through the genetic code and other chemical interactions - Monod's *Le hasard et la nécessité* (1970) expands this framework to the realm of ideas and the social. "For a biologist it is tempting," Monod says,

> to draw a parallel between the evolution of ideas and that of the biosphere. For while the abstract kingdom stands at a yet greater distance above the biosphere than the latter does above the nonliving universe, ideas have retained some of the properties of organisms. Like them, they tend to perpetuate their structure and to breed; they too can fuse, recombine, segregate their content; indeed they too can evolve, and in this evolution selection must surely play an important role.[49]

It was against this continuity Althusser so strongly objected. But for Serres this continuity highlights how Monod embodies the new new scientific spirit: the insights of molecular biology can also be applied to the constitution of molecular biology as a scientific practice. Just as Brillouin's information theory, Monod's molecular biology contributes to a general framework that understands the world – from atom to society – in informational terms. This generalizing tendency brings us to the third characteristic of the new new scientific spirit: a new classification of the sciences.

The model Serres proposes for the new new scientific spirit, echoing Comte, is that of a new Encyclopedia. The different sciences are no longer classified according to a traditional hierarchy with physics at the bottom and sociology at the top. Instead, the new new scientific

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[46] (Serres 1977a, 287)
[47] (Serres 1972, 60)
[48] (Serres 1972, 43-44)
[49] (Monod 1972, 165)

spirit follows the model of horizontal translation: all fields are on the same level, but relate through a set of internal cross-references and cross-fertilizations: "the new new spirit is developing into a philosophy of transport: intersection, intervention, interception."[50] It is not so much that the physical information theory is 'applied' to biology, but both are characterized by a set of isomorphic structures that can mutually inspire one another. New insights from physics can inspire biology, but also vice versa: developments in molecular biology can also inspire isomorphic frameworks to look at physical phenomena. But if ideas from the physical realm can without problem jump to the level of social practices, such as experimentation, what then is the place of biology? For this, we turn to a final source of Serres, Henri Atlan.

3.2. HENRI ATLAN AND THE PROBLEM OF MEANING

In *L'organisation biologique et la théorie de l'information* (1972) and *Entre le cristal et la fumée* (1979), the French biologist Henri Atlan (°1931) developed a similar project as Serres. The central question of his work is the question of biological self-organization: how does biological organization emerge? Atlan uses information theory to answer this question. But an element missing in the first generation of information theorists is the *generation* of order and information. As we saw, Shannon (1948) was mainly concerned with the perseverance of information, but how did now information and organization arise in the first place?

For this Atlan invokes the work of Heinz von Foerster and his principle of *order from noise*. Whereas for Shannon (1948) noise was seen as negative, Von Foerster (1960) argued that noise plays a positive role in the generation of new levels of order. Von Foerster gives the example of a set of magnetized cubes (e.g. three sides positive, three sides negative). If you put them in a box and then shake them, they seemingly 'self-organize' in geometrical figures when you open the box again. The noise of the shaking results in the creation of order. Thus self-organizing systems create and uphold their order, not just by excluding noise, but also by productively incorporating parts of its noisy environment: "the system is in close contact with an environment, *which possesses available energy and order,* and with which our system is in a state of perpetual interaction, such that it somehow manages to 'live' on the expenses of this environment."[51] According to Atlan, this offers us a model to understand self-organization:

> Within the framework of this theory, self-organization can be described as a dynamic process by which random perturbations or noise acting on the channels of communication in an organized system are able to produce, not only disfunction and disorganization, but also a change in organization to a state with more complexity and less redundancy.[52]

Though a step in the right direction, Von Foerster's principle does not suffice to understand self-organizing biological systems. The example of Von Foerster only works if one simulates ignorance about magnetic forces. If you take these forces into account, the produced order is not surprising, but the expected product of magnetic forces. It is closer to crystal formation than to a living system: there is growth, but it tends to follow the same and predictable repetitive structure. Therefore Atlan proposes his own principle, namely that of *complexity from noise.*

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[50] (Serres 1972, 10)
[51] (Von Foerster 1960, 33)
[52] (Atlan 1987, 564)

Though information theory deals with communication, the early information theorists stressed a clear restriction: information theory ignores the human value of information and thus the question of meaning. It does not differentiate between a 100-letter sentence from Shakespeare or an equally improbable sentence of 100 randomly selected letters. "In other words, we define 'information' as distinct from 'knowledge'," Brillouin acknowledges, "for which we have no numerical measure. We make no distinction between useful and useless information, and we choose to ignore completely the value of the information."[53] As Atlan summarizes, information theorists

> can do very well without having to bother with understanding and formalizing how meaning is created: both the meaning of information transmitted in a channel and that of a computer program are assumed to exist but the mathematical theories which deal with these problems do not have to take this into account. In information theory, the fact that messages have meaning is obvious, but remains implicit since this theory treats problems of coding and transmission efficiency without having to consider the actual meaning of the messages to be coded and transmitted.[54]

Interestingly, Atlan and Serres try to turn this restriction into an advantage. They will argue that it shows that we can develop a convincing analysis of meaningful information without the need for the notion of the subject. In the words of Atlan, "[w]e proceed in a negative way, by taking advantage of what is usually considered a flaw in information theory – namely the fact that Shannon's probabilistic information theory does not make any distinction between meaningful and meaningless information."[55]

Atlan achieves this by focusing on the relativity of the observer's position, and thus the acknowledgment of a multilayered, hierarchical model of reality, where noise and information are never absolutely given, but relative to the layer in which the observer situates itself:

> This observer, external to the system, is in fact, in a hierarchical system, a higher (and encompassing) level of organization compared to the elementary systems that constitute it; it is the organ in relation to the cell, the organism in relation to the organ, etc. It is in relation to this that the effects of noise on a channel within the system can, under certain conditions, be positive.[56]

In other words, that there is no clear distinction between information and noise is not a problem, because such a distinction only exists relative to the layer from which one is making that distinction. What is noise for one level can be meaningful information for another, higher level. "The meaning of the message, in contrast, is never intrinsic to the message; the meaning is the relationship of the message to some reference point outside of the information borne by the message. Something or somebody has to 'read' the message. Meaning is referential and contingent."[57] In *Le Parasite* (1980), Serres gives the example of a telephone call at a banquet:

> At the feast everyone is talking. At the door of the room there is a ringing noise, the telephone. Communication cuts conversation, the noise interrupting the messages. As soon as I start to talk with this new interlocutor, the sounds of the banquet become noise

[53] (Brillouin 1956, 9)
[54] (Atlan 1987, 563)
[55] (Atlan 1987, 564)
[56] (Atlan 1979, 70)
[57] (Atlan and Cohen 1998, 713)

> for the new 'us.' The system has shifted. If I approach the table, the noise slowly becomes conversation.[58]

Whereas the meaningful conversation becomes noise once one shifts to another level, it regains its meaning once one shifts back to the level of the conversation. On his turn, Atlan uses the example of noise in cells: whereas badly formed proteins, with non-proper enzymatic properties, can be seen as 'noise' for the metabolism of the cell, if one switches to the level of the organ or the organism, this noise can be a source for adaptation to new environments:

> From the point of view of the organ or physiological apparatus, this same noise has the effects of creating variety and heterogeneity among cells, which allows them to more adaptability. Therefore, up to a certain point. and providing the redundancy of the cell is large enough so that these false proteins are not going to impair the cell function, the same effects of the noise on the channel within the cell which are viewed as detrimental by the cell itself can be viewed as beneficial by the organ.[59]

Self-organization thus requires two conditions: on the one hand "enough initial redundancy" to be "used as a reservoir, or potential for self-organization;" and on the other hand a certain "inertia, i.e. its reliability or resilience must suffice to keep small perturbations from immediately destroying it."[60] In that sense, a living system is not to be reduced to a repetitive crystal as in Von Foerster's magnetized cubes, but neither is it completely in flux. A certain degree of repetitiveness and redundancy is required to maintain a stability and resilience against noise. Hence Atlan's central metaphor: a living system situates itself "between two extremes: a perfectly symmetrical repeating order of which the crystals are the most classic physical models, and an infinitely complex variety and unpredictable in its details, like that of the evanescent forms of smoke."[61]

4. A biophilosophy without a subject

The work of Michel Serres can thus be seen as part of another philosophical project, one inspired by information theory, which thinks about biological organisms in a radically different way. References to the role of consciousness or experience are absent. Instead, the problem of meaning is translated in an informational framework, where information and noise are defined in relation to the framework of the observer. These observers, however, are not interrogated from a hermeneutical or phenomenological perspective – how does the information or meaning presents itself to the subject? – but in an operational way: what kind of effects does this information have on the observer, and how is this shown in a change in behaviour?

We see this in Atlan, who explicitly equate the two: "We suggest to define the observed meaning of information as its observed consequence on the receiver. In other words, we suggest to unify the levels B and C of Weaver (semantics and efficiency), although we know that in our linguistic experience it is not so."[62] The end result is a framework that enables one to analyze the different levels of reality (physical, biological, social), without the need to invoke questions concerning subjectivity. In that sense, the biological level does not possess any kind of

[58] (Serres 2007, 66)
[59] (Atlan 1977, 179)
[60] (Atlan 1987, 565)
[61] (Atlan 1979, 5)
[62] (Atlan 1977, 180)

qualitative uniqueness, but is but one level that situates itself relatively, but in an isomorph fashion between the others.

In a similar vein, Serres concludes that there is no genuine distinction anymore between subject and object, since all must be interpreted as layers of emitters and interpreters of information:

> I know who is the final observer, the receiver at the end of the chain: the one, precisely, who emits language. But I don't know who is the first transmitter on the other end. It's a black box indefinitely. A box of boxes, and so on. I can thus go as far as I want, to the cells, to the molecules, provided, of course, that I change the object observed. All I know, but of that I'm sure, is that they are all structured by the information-background, random-program, or entropy-negentropy pair.[63]

And therefore, according to Serres, "[n]othing distinguishes me ontologically from a crystal, a plant, this animal and the order of the world: we drift together towards the noise and the black background of the universe, and our various complexions of system up the entropic river in the direction of the solar source, itself derived from it."[64] All physical, biological and social phenomena can be analyzed in an isomorph way through this framework.

Hence my final claim: this framework has had an effect on a next generation of thinkers who, inspired by this informational framework, started to analyze social phenomena. Hermeneutical or phenomenological questions concerning subjectivity and meaning are absent in their work, as are specific reflections on biology and consciousness. Instead, we are faced with a paradoxical biophilosophy without a subject that jumps over subjectivity and started to study social phenomena through an informational lens.

Atlan already suggests that, though originating from reflections on biology, it is possible "to extend some of these considerations to other systems and other forms of organization, human in particular" and thus "educate us about the logical possibilities of organization in general."[65] Atlan refers to the work of Edgar Morin, Serres and even Canguilhem. In the case of Canguilhem, Atlan refers to his encyclopedic lemma' about 'la vie', where Canguilhem argues that Atlan's complexity-from-noise principle can provide a cybernetic understanding of the death thrive of Sigmund Freud.[66] More broadly, Atlan, Morin and Serres were member of the Group of Ten (*Groupe des Dix*), a group of French thinkers who, between 1968 and 1976, tried to apply this new framework to societal and political issues.[67] Created by the economist Robert Buron, the neurobiologist Henri Laborit, the sociologist Edgar Morin and the Jacques Robin, the group initially consisted of ten members but soon enough others joined, including Atlan and Serres.

The Group of Ten aimed to explore to what extent social and political phenomena, ranging from elections to economic cycles, could be interpreted as following the above framework of self-organization. The Group of Ten failed to have policy impact, but it did result in a number of influential publications, such as Rosnay's *Le macroscope* (1975), Passet's *L'économie et le vivant* (1979), but also Morin's *La méthode* (1977) and Atlan's *Entre le cristal et la fumée* (1979). Serres himself shifted away in the 1980s from strictly epistemological questions

[63] (Serres 1977a, 270)
[64] (Serres 1997a, 271)
[65] (Atlan 1979, 6)
[66] (Canguilhem 1975)
[67] (Chamak 1997)

concerning the applicability of this framework to all kinds of phenomena. In his later work, and inspired by his idea that science produce its own epistemology, he conceived of a new role of the philosopher, namely the development of an 'anthropology of science', i.e. a political analysis of the violence that result from science, exemplified by the ecological crisis.[68] Two scholars that have been more effective in their analysis of social phenomena are René Girard and Bruno Latour.

4.1. THE SCAPEGOAT AS SELF-ORGANIZATION

If we turn to the work of René Girard (1923-2015), we enter a different world. Girard was a French anthropologist and literary critic, famous for his book *La violence et le sacré* (1972). Girard offers a rereading of the history of religion, arguing for the omnipresence of the phenomenon of the scapegoat: a figure on which all the wrongdoings of a society are projected and which is outcast, while at the same time sacralized. The most obvious example would be Jesus, who was scapegoated, but simultaneously soon seen as holy (though the example of Jesus is actually more complex).

Girard's work offers a mechanism that explains the historical omnipresence of this scapegoat phenomenon. This has to do, according to Girard, with the nature of human desire. Central to this desire, is not so much common appetite for food and shelter, but a 'metaphysical desire' that follows a mimetic structure: you desire something, not so due to its intrinsic properties, but because someone else desires that object. You want it because someone else wants it. "We must understand that desire itself is essentially mimetic, directed toward an object desired by the model."[69]

Whereas such desires are limitless, the object of desire is not. Only one can possess it. Hence it typically results in conflict. This violence is also structured in a mimetic way: I desire to hurt you because you wanted to hurt me. "Only violence can put an end to violence, and that is why violence is self-propagating. Everyone wants to strike the last blow, and reprisal can thus follow reprisal without any true conclusion ever being reached."[70] The result is, paradoxically, that the initial object of desire is soon forgotten and the individuals become doubles of one another, mirroring each other's violence while having long forgotten why they started to fight in the first place. This mimetic violence is moreover contagious: "if two persons are fighting over the same object, then this object seems more valuable to bystanders."[71] Soon enough, violence spreads throughout the whole collective.

Nonetheless, we live in semi-stable societies where violence is not omnipresent. Here the scapegoat mechanism enters the picture: mimetic violence is halted because mimetic spirals tend to reach points where the blame is projected on one scapegoat, namely an individual or group that, often by accident, is put into the spotlight:

> The killing of the scapegoat ends the crisis, since the transference against it is unanimous. That is the importance of the scapegoat mechanism: it channels the collective violence against one arbitrarily chosen member of the community, and this

[68] (Simons 2022, chapter 5)
[69] (Girard 2017, 146)
[70] (Girard 2017, 26)
[71] (Girard 2008, 64)

> victim becomes the common enemy of the entire community, which is reconciled as a result.[72]

This also give us a reason why the scapegoat is often divinized, since it is the pacifier of societal violence, and explains the structure and functions of numerous rituals and taboos. They are attempts to ban or contain forms of dedifferentiation (such as blood, twins, death) that risk to provoke mimetic violence.

This is in a nutshell Girard's general framework. Though seemingly unrelated, there is in fact a strong connection with the informational framework we fleshed out in this chapter. This is first of all shows in the biographical connections: Serres and Girard were very good friends, meeting each other in Buffalo in 1975, later becoming colleagues in Stanford. In 2005 Serres would also sponsor Girard's election to the *Académie Française.* Serres was fascinated by Girard and found in the latter a similar framework as the one he was exploring in his own oeuvre. For that same reason also Henri Atlan had an interest in Girard:

> Girard's answer, at least in its logical form, is comparable to the answer biological theory brings to the same problem, in so far as both assign an important part to randomness or chance. Starting out from an undifferentiated state made repetitive through the labour of mimesis, very slight perturbations in the way in which these repetitions take place lead to a process of differences and of differentiations.[73]

Serres similarly endorses this isomorphism between Girard's scapegoat's mechanism and physical and biological processes of self-organization, even comparing it to a physical law: "I have long assumed that violence obeys, in groups, constants similar to those of energy. Just as mechanics and thermodynamics base their exact truths on a stable amount of force in the Universe, does politics rest on a permanent volume of violence in communities?"[74]

A third example is the work of Jean-Pierre Dupuy (°1941), another scholar fascinated with the question of self-organisation. Dupuy befriended both von Foerster and Atlan, and regularly refers to Serres as well. He met Girard in the United States, and together they organized a set of interdisciplinary conferences, such as the 1981 symposium on 'Disorder and Order' (with speakers such as Atlan, von Foerster, but also Ilya Prigogine, Isabelle Stengers, Cornelius Castoriadis and Francisco Varela). It was Dupuy who, according to Girard, "made me aware of the relationship between 'chaos theory' and the mimetic theory."[75] Dupuy indeed describes Girard's theory as "a special case of the logic of self-organisation":

> The autonomous system, in Girard, is violence, acquisitive mimesis, the closed circle that binds men to their rivals. He is the real subject of the story. Men, as individuals, are simple subsystems, producers of noise and fury that will only be transformed into meaning at the higher level, that of autonomous violence.[76]

Like in information theory, we find in Girard's theory a form of reflexivity: though the violent participants do not see this, we are capable to realize the meaning of the scapegoat mechanism. This itself can be explained by the theory, i.e. it has to do with the fact that we situate ourselves

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[72] (Girard 2008, 65)
[73] (Atlan 1988, 194)
[74] (Serres 2019, 304)
[75] (Girard 2008, 41)
[76] (Dupuy, 1982, 276-277)

on a higher level: “Only the external observer - modernity and its science - is capable of placing himself at the logical level higher than that of the social-historical, and of seeing the transmutation of noise into organization, of chance into meaning.”[77] This reflexivity, however, did not start with science. According to Girard Christianity is the religion that uncovers the meaning of the scapegoat mechanism. Hence, the reason why the Jesus example is more complex: it follows the scapegoat mechanism, but in an explicit manner, unmasking its violent role in history. Dupuy and Serres endorse this interpretation of Christianity, while Atlan (1988) argues against it, claiming that this reflexivity is already present in Judaism.

Girard’s theory is thus an instance of this broader biophilosophy without a subject. In the kind of Girardian analyses one does not find the traditional question of the subjectivity and interpretation. Instead, phenomena are explained in a formal matter, by showing how the same spontaneous process of self-organization occurs, in this case through mimetic violence and the scapegoat mechanism. No particular place is left for biological phenomena, who are just seen as one isomorphic level between the others.

4.2. Science as Order out of Noise

A similar story holds for Bruno Latour (°1947). Latour’s early work was an ethnographical study of scientific laboratories, often interpreted as a form of social constructivism, claiming to explain the progress of scientific debates through social factors. Though Latour was indeed partly inspired by the Strong Programme of the Edinburgh School in the 1970s, embodied by David Bloor (1976), his work was more substantially framed through the informational framework. We find evidence for this in one of Latour’s first articles, where he frames his sociology of science in informational terminology. Sociologists have shown, according to Latour, that science is not “less disorderly, less noisy, less fictional than the rest of history”.[78] Hence, the task of the sociologist is to find a framework to map how science nonetheless transitions from this disorder to the order of a well-argued scientific statement. Latour is clear about where he finds this framework: “The only attempt has not been made by sociologists of science, but by isolated scientists dealing with information, or with turbulent phenomena.”[79] He refers to Brillouin (1964), Atlan (1972), Prigogine and Stengers (1979) and Serres (1977b):

> In the old framework, disorder, turbulence, agitation, circumstances, were to be *eliminated* for a world of order, logics and rationality to appear and be maintained. In the new framework, order is nothing but local circumstances obtained from, maintained by, dissolved from time to time in disorder; if you eliminate the opportunism, the context, the fiction building, the agitation, the reconstruction, the rationalization you get *nothing* at all; if you introduce them you understand how the scientific facts, discoveries and theories emerge and are maintained.[80]

We find a similar story in the book that made his career: *Laboratory Life* (1979), written with the sociologist Steve Woolgar. Again the sociologist is faced with a “disordered array of observations with which scientists struggle to produce order”.[81] The problem is how a chaotic network of actors in a laboratory stabilizes into a scientific fact. Once more they draw on

[77] (Dupuy 1982, 276-277)
[78] (Latour 1981, 69)
[79] (Latour 1981, 70)
[80] (Latour 1981, 70)
[81] (Latour and Woolgar 1986, 36)

information theory: scientific statements become meaningful by becoming informational, i.e. statistically improbable: "If a large number [of alternative interpretations] can easily be thought of, the original statement will be taken as meaningless and hardly distinguishable from others. If the others seem much less likely than the original statement, the latter will stand out and be taken as a meaningful contribution."[82] For this, they explicitly make us of the concept of "*noise* (or more exactly, the ratio of signal to noise)"[83], drawing on "Michel Serres, who, in turn, had been greatly influenced by authors such as Brillouin and Boltzmann and by new developments in biology".[84]

Laboratory Life thus concerns the question of how one possible scientific statement about the world gets the upper hand over its rivals. This happens not so much through a social power struggle, but through an informational struggle: scientists mobilize data, experiments, arguments, other scientists, scientific articles, etc., in order to create an inequality between their own statement and the others. They thus constantly struggle to create a difference between information and noise within the scientific literature. "In principle, the number of alternative readings of [a] particular utterance is very large. The number which will be accepted as plausible by an informed audience, however, will be constrained by the particular context which is brought to bear upon the reading of the utterance."[85]

To argue for this perspective, Latour and Woolgar invoke several of the sources we already encounter. For instance, they draw a parallel with Monod's *Le hasard et la necessité*. Also in Monod's case it is a question of how a specific order (living organisms) follows from a state of disorder. Similarly how in biology there is no need to presuppose a given blueprint, in science there is no ordered reality that has to be represented. "Reality is constructed out of disorder, without the use of any preexisting representation of life".[86] A similar parallel is drawn with Brillouin's interpretation of Maxwell's demon:

> Maxwell's devil provides a useful metaphor for laboratory activity because it shows both that order is *created* and that this order in no way preexists the devil's manipulations. Scientific reality is a pocket of order, created out of disorder by seizing on any signal which fits what has already been enclosed and by enclosing it, albeit *at a cost.*[87]

The result is an application of this informational model on a whole set of societal phenomena. Initially restricted to the history of science, it was soon expanded to other domains, forming Actor-Network Theory (ANT). ANT was in fact initially known as the 'sociology of translation', where 'translation' was a notion explicitly borrowed from Serres.[88] This is not only the case for Latour, but also of Michel Callon.[89] Translation refers to the differentiation work of scientists: they have to translate a divergent set of phenomena and actors (e.g. a soil sample from Brazil; an experiment done in France; the opinion of a rival scholar in Japan) in the same register (e.g. a paper, a graph, an argument). The result is a statement, backed up by a network, that makes it improbable: not just any statement, but an unlikely and informative one.

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[82] (Latour and Woolgar 1986, 240-241)
[83] (Latour and Woolgar 1986, 239)
[84] (Latour and Woolgar 1986, 251)
[85] (Latour and Woolgar 1986, 35)
[86] (Latour and Woolgar, 1986, 250)
[87] (Latour and Woolgar 1986, 246)
[88] (Serres, 1974a)
[89] (Callon 1981, 219n16)

Similar to Girard, the result is a perspective on social phenomena that draws inspiration from information theory, and glosses over the realm of biology and subjectivity. Latour and Woolgar in fact provocatively propose a moratorium on these subjective explanations:

> Perhaps the best way to express our position is by proposing a ten-year moratorium on cognitive explanations of science. If our French epistemologist colleagues are sufficiently confident in the paramount importance of cognitive phenomena for understanding science, they will accept the challenge. We hereby promise that if anything remains to be explained at the end of this period, we too will turn to the mind![90]

The result is an analysis of science that has no need to speak about the subject, its experience, its thinking, or its interpretations. Again, a framework that maps the formal logic of how scientific practices self-organize into meaningful statements suffices. Nonetheless, as in the case of Girard, a level of self-reflexivity remains, this time inspired by David Bloor's original Strong Programme: "the realisation that observers of scientific activity are engaged in methods which are essentially similar to those of the practioners which they study."[91] In the same way that scientists have to translate the initial disorder into the order of a scientific statement, "[t]he observer's task is to transform notes […] into an ordered account".[92] We again have a reflexivity in the form of an isomorphism between the different levels: the work of the sociologists is formally structured in a similar way to that of the scientists themselves.

5. Conclusion

In this chapter I looked at how the work of Michel Serres embodied an alternative biophilosophy, diverging from themes associated with Serres's supervisor Georges Canguilhem. Serres accused Canguilhem of not systematically picking up the molecular revolution which was going on at that time. Though we saw that Canguilhem did engage with molecular biology, Serres had several reasons to argue for this break. First of all there were biographical and political reasons: a personal fallout with Canguilhem and a political struggle with Althuserianism.

But besides that, we also saw how Serres invoked an alternative biophilosophy, which drew inspiration from information theory. Inspired by Brillouin and Atlan, Serres sketched a biophilosophy in which the living organism, and the human mind, plays no exceptional role anymore. Rather, we end up with a more general informational framework focused on self-organization, a process that is seen at work at all levels of reality in an isomorphic way.

The result is a biophilosophy without a subject, a framework that has had impact far beyond philosophy of biology. It has had a profound influence on a number of authors, of which we have only briefly explored two: Girard and Latour. But one could explore how a similar way of thinking is at work in a number of other authors. This is not only the case for authors who explicitly focused on biology, such as Gilbert Simondon, Raymond Ruyer, Edgar Morin or Francisco Varela, but also those where a biophilosophy is present in its absence, such as Cornelius Castoriadis, Michel Deguy, Gilles Deleuze, Judith Schlanger or Isabelle Stengers. For instance, one can refer to Deleuze and Guattari's infamous *L'anti-Œdipe* (1972) and *Mille plateaux* (1980), where they effortly shift from reflections on physics to social ontology,

[90] (Latour and Woolgar 1986, 280)
[91] (Latour and Woolgar 1986, 30)
[92] (Latour and Woolgar 1986, 37)

framing it in a common terminology of machines, rhizomes and lines of flight. In this framework biological topics are present, but there is no need to invoke the notion of the subject or experience in any traditional sense. In a similar vein, Castoriadis in his reading of historical change in *Les carrefours du labyrinthe* (1978), draws on complexity theory and the concept of emergence to conceptualize the arise of social institutions. Once again, it is a framework that 'jumps over' subjectivity, from the physical to the social sphere. In that sense, one could argue that continental philosophy of biology has a more broader, yet invisible history than often presupposed.

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