

LIFE, SELF-ORGANIZATION AND TELEOLOGY

VIDA, AUTO-ORGANIZAÇÃO E TELEOLOGIA*

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Abstract: The paper shows how far goes the convergence between the concept of *autopoiesis*, developed by the biologist and cognitive scientist Francisco Varela, and the notion of *Naturzweck* introduced by Immanuel Kant in *Kritik der Urteilskraft* (1790). Despite the notorious Kantian advance on the description of the living, his commitment to Newtonian mechanism prevents one from adopting the domain of life as a qualitative leap in relation to pure matter, a problem that the ontology underlying the concept of *autopoiesis* overcomes.

Keywords: Kant. Francisco Varela. Teleology. Autopoiesis. Vitalism.

Resumo: Trata-se aqui de demonstrar até onde vai a convergência entre o conceito de *autopoiesis*, desenvolvido pelo biólogo e cientista cognitivo Francisco Varela, e a noção de *Naturzweck* introduzida por Immanuel Kant na *Kritik der Urteilskraft* (1790). Apesar do notório avanço kantiano acerca da descrição do vivente, seu compromisso com o mecanicismo newtoniano impede a admissão do domínio da vida como um salto qualitativo em relação à pura *res extensa*, um problema superado pela ontologia subjacente ao conceito de *autopoiesis*.

Palavras-Chave: Kant. Francisco Varela. Teleologia. Autopoiesis. Vitalismo.

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INTRODUCTION

In *The Parallax View* (2006) Slavoj Žižek highlights the ongoing relevance of Friedrich Hegel by pointing out echoes of his philosophy in contemporary biology, especially in regards to the notion of *autopoiesis* originally developed by Humberto Maturana and Francisco Varela.¹

A series of contemporary researchers, from Lynn Margulis to Francisco Varela, assert that the real problem is not how an organism and its environs interact or connect but, rather, the opposite one: how does a distinct self identical organism emerge out of its environs? How does a cell form the membrane which separates its inside from its outside? Thus the real problem is not how an organism adapts to its environs, but how it is that there is something, a distinct entity, which must adapt itself in the first place. And it is here, at this crucial point, that today's biologists' language starts to resemble, quite uncannily, the language of Hegel. When Varela, for example, explains his notion of autopoiesis, he repeats, almost verbatim, the Hegelian notion of life as a teleological, self-organizing entity. His central notion, that of a loop or bootstrap, is reminiscent of the Hegelian *Setzung der Voraussetzungen* (positing the presuppositions). (ŽIŽEK. 2006, pp. 204-205).

The Hegelian character present in the concept of life established by Varela and Maturana is undeniable. However, as it is known, Immanuel Kant had already famously described - in his third critique - life as a self-organizing teleological activity², i.e., the *Kritik der Urteilskraft* already announces the core of the notion of *autopoiesis* through the defense of life as a 'natural end', a 'objective purposiveness of nature' or simply a 'natural purpose' [*Naturzweck*]. In other words, Varela & Weber (2002) indicate that Kant can be understood as precursor of the contemporary notion of life as an operational closed system that has the maintenance of itself as its own cause and effect: "Kant in his *Critique of Judgement* developed the possibility of a third way between a strong teleology and a brute materialism." (VARELA & WEBER, 2002, p. 99).

Nevertheless, as we shall see, Kant didn't go far enough in his discussion on self-referenced systems because, while Hegel and Varela stand behind ontologies that assume the retroactive

¹ MATURANA & VARELA, *The Tree of Knowledge: The Biological Roots of Human Understanding* (1992).

² KANT, I. *Critique of Judgement* (1987); LEBRUN, Gérard. *Kant et la fin de la métaphysique* (2003); WEBER, Andreas; VARELA, Francisco J. *Life after Kant: natural purposes and the autopoietic foundations of biological individuality*. (2002).

causality that emerges from primordial forms of cellular life, Kant, on the other hand, despite his notorious advance, still holds mechanical views on nature due to Isaac Newton's influence. That's why Slavoj Žižek draws the following conclusion: "Hegel is – to use today's terms – the ultimate thinker of autopoiesis, of the process of the emergence of necessary features out of chaotic contingency, the thinker of contingency's gradual self-organization, of the gradual rise of order out of chaos." (ŽIŽEK, 2012, p. 467). Thus, Kant's commitment to Newton becomes an "obstacle for the conceptualization of the organism" (LEBRUN, 2002, P. 330). To put it another way, the antinomy of the teleological judgement means that, despite Kant's defense of the use of a teleological language as a descriptive presupposition of life, the possibility of a purely mechanical Newtonian explanation is still lurking in the third critique (as contradictory as it may sound, something Kant himself admits it). In this sense, by following such description of the *res extensa*, as Lebrun points out, we are forced to admit that "animated matter, as any given matter, cannot be distinguished from brute matter. [...] this particular notion of matter makes it impossible any attempt to understand the material genesis of an organic body" (LEBRUN, 2002, pp. 330-331).

In the *Analytic of Teleological Judgement*, where the relative purpose is distinguished from the intrinsic purpose, Kant establishes the epistemological legitimacy on speaking of natural purposes within basic manifestations of life. In that way, Kant searches for a way to elucidate "the discontinuity between life and matter." (LEBRUN, 2002, p. 331). Kant's notion of *Naturzweck* anticipates to a great extent that which was later formalized by Humberto Maturana and Francisco Varela. Thus, *Naturzweck* and *Autopoiesis* both describe a given arrangement of matter in which the parts are self-organizing, self-making and, by way of doing that, refer to itself as a totality, as a *form*. The problem, as we said, is that Kant is ambiguous in his description, leaving room for a linear or mechanistic causality to be the ultimate explanation. *Autopoiesis*, as we also noted, overcomes this by offering a dialectical view of nature which finally establishes a difference between Kant and the notion offered by Maturana and Varela. As Žižek says, "this retroactivity is what Kant was not able to think, and Hegel himself had to work long and hard to conceptualize it." (ŽIŽEK, 2012, p. 468). Leaving that aside, one must realize how advanced is Kant's notion: life is an internal teleology that is cause and effect of itself, that is, life is a continuous process of self-reference where the parts interact in such a manner to give rise to a whole. A natural purpose is a self-making, self-referencing totality that,

through self-maintenance, imposes a limit between it and its environment: “if a thing is a natural product but yet we are to cognize it as possible only as a natural purpose, then it must have this character: it must relate to itself in such a way that it is both cause and effect of itself.” (KANT, 1987, p. 251, § 65).

For Varela, a living being (an autopoietic system, to put it in his terms) is simply any pattern of matter that “transforms matter in itself” (VARELA, 1979, p. 17) through a natural process that, nonetheless, is fundamentally normative. Such normativity is a necessary unfolding of the process of self-making. An autopoietic being means that an instantiated totality brings forth an *Umwelt* because the act of materializing itself by transforming matter in order to keep a particular *form* can only occur by the discrimination of the essential or relevant features of its surrounding. As Georges Canguilhem says, “To live, even for an amoeba, is to discriminate and exclude.” (CANGUILHEM, 2009, p. 52). Similarly, Maurice Merleau-Ponty (the root of the current 4E paradigm in cognitive science that Varela helped to shape) reminds us that an animal “projects the norms of its environment and itself lays down the terms of its vital problem” (MERLEAU-PONTY, 2005, p. 90).

To admit the notion of *autopoiesis* leads one to affirm that “organisms are not only self-regulating but built from cells that materially establish themselves.” (VARELA & WEBER, 2002, p. 116). This self-establishment occurs because of and through the normative demarcation that unveils the *milieu*. Thus, the process of a self-referent circularity that discriminates the environment for its vital equilibrium becomes the foundation of the system itself. In other words, the causality of the living is like a fold in itself or a “purpose folded in itself, which Hegel will call ‘objectivity of finality’ (LEBRUN, 2002, p. 342). Life, thus, is the self-instantiation of a material totality that circumscribes an existential surrounding. The most basic manifestation of life is already intentionality. There is a *telos* from the getgoing because to be alive, or to be an embodied intentionality, is another way of saying that a particular autopoietic system has a value hierarchy concerning actions and reactions to be carried out.

Kant’s third critique is the source for this sort of reasoning on life. It foreshadows much of the conception delineated by *autopoiesis*: “Contrary to an often superficial reading, Kant gives a multi-faceted account of the living, and anticipates this modern reading of the organism, even introducing the term ‘self-organization’ for the first time.” (VARELA & WEBER, 2002, p. 97). Notwithstanding,

despite the compliment, Varela & Weber find no trouble in recognizing the limits of the Kantian stance. But not only Hegel is a reference to Varela & Weber on how to overcome that, but also a particular line of biologists and philosophers of biology headed by Heidegger's former student, Hans Jonas.

The paper is divided as follows: first, *autopoiesis* is defined; secondly, it is indicated how close Kant's account of the living is to contemporary biology; in the third section, we will demonstrate Hans Jonas' specific contribution; finally, we conclude by stressing out Varela's view that *autopoiesis* can be seen as an unfolding of the kantian legacy.

I.

Life, understood as *autopoiesis*, means the circular organization of a given physical and chemical process of self-making that instantiates a boundary. This particular kind of system is, above all, a *form* or *Gestalt*, i.e., there is something more than what the analytical decomposition of matter can provide, an intrinsic teleology that maintains the *form* despite the ongoing change of the parts. Yet this *form* is always materially grounded. There's no room for dualism or vitalism.

Autopoiesis is a concept that serves as a criterion for defining the living. What counts as true intentionality? What is this specific pattern of matter that becomes normative and purposive? To make it clearer, let's look at an opposing position: according to Daniel Dennett, mitochondria are "tiny living things in their own right, with their own DNA, living their entire lives within the walls of the cells of larger organisms that compose other lineages." (DENNETT, 1995, p. 90). If we follow what *autopoiesis* lays out, however, mitochondria cannot be thought of the same category as bacteria, amoeba and human beings. As Evan Thompson says (2007, p. 103), for a material arrangement to be considered as autopoietic first there has to be a *semipermeable boundary*; secondly, the molecules within this boundary must be continuously arranged by the organization itself though a non-stop material exchange with the *Umwelt*, originating a *reaction network* where the totality or *Gestalt* can linger on despite the flux of change: finally, *autopoiesis* occurs through the dialectical *interdependency* of the criteria aforementioned. In other words, if the *reaction network* is a process that is maintained

because of the *semipermeable boundary* and the *semipermeable boundary*, in turn, persists because of the unceasing of the *reaction network*, then we can confirm we are beholding an autopoietic process.

How to know when a being is alive? Which are our criteria? Throughout the history of biology, many criteria have been proposed and all of them present difficulties. [...] When we speak of living beings, we already suppose something in common between them, otherwise we wouldn't put them in the designated class for the concept of "alive". What's not said, however, is which organization defines them as a class. Our proposal is that living beings are defined by - literally - the fact that they produce themselves continuously (VARELA & MATURANA, 2001, p. 48-52).³

In order to illustrate what it means the ceaseless making of oneself, Thompson (2007) uses the three criteria above mentioned to classify the following compounds: virus, crystal, mitochondria, DNA, bacteria and amoeba.

| System | Criterion 1 <i>Boundary</i> | Criterion 2: <i>Network</i> | Criterion 3: <i>Interdependent</i> | Conclusion: Autopoietic? |
|--------------|--------------------------------|--------------------------------|---------------------------------------|-----------------------------|
| Virus | Yes | No | No | No |
| Crystal | Yes | No | No | No |
| Bacterium | Yes | Yes | Yes | Yes |
| Amoeba | Yes | Yes | Yes | Yes |
| Mitochondria | Yes | Yes | No | No |
| DNA section | No | No | No | No |

(Adapted from THOMPSON, 2007, p. 103)

³ “Como saber quando um ser é vivo? Quais são os nossos critérios? Ao longo da história da biologia, foram propostos muitos critérios e todos eles apresentam dificuldades. [...] Quando falamos dos seres vivos, já estamos supondo que há algo comum entre eles, do contrário não os colocaríamos na mesma classe que designamos com o termo “vivo”. O que não está dito, porém, é qual é a organização que os define como classe. Nossa proposta é que os seres vivos se caracterizam por - literalmente - produzirem de modo contínuo a si próprios”.

Thompson's commentary on the table above precisely summarizes what *autopoiesis* entails: an autopoietic system is whenever chemical reactions produce molecules that not only participate and catalyze such reactions but - because of the nature of this particular dynamic - permit the arise of an existential or vital surrounding through the process of establishing a physical boundary in which the reaction network is compartmentalized.

A bacterium (a prokaryote) and an amoeba (a eukaryote) are autopoietic because they satisfy all three criteria. A crystal, however, is not autopoietic because its components are not generated from within itself. Replicative molecules, such as DNA and RNA, are also not autopoietic because they have neither a semipermeable membrane nor an internal reaction network, and thus they do not instantiate a circular, self-producing organization. Viruses are often described as living but they do not satisfy the autopoietic criteria. A virus is a bounded structure with a protein coat, thereby satisfying the first criterion. But the second (and hence the third) is not satisfied because the molecular components of a virus (nucleic acids) are not generated inside the virus, but outside in the host cell. A virus has no metabolism of its own and thus is not self-maintaining in the autopoietic sense. Outside of a host cell, in the environment, a virus can persist, but it does not exchange matter with its environment in a continual self-producing way. (THOMPSON, 2007, pp. 103-104).

As we can see, contrary to Dennett's suggestion that mitochondria are tiny living things, *autopoiesis* posits that despite the presence of a membrane and a *reaction network*, there isn't an *interdependency* that makes the physical boundary a direct unfolding of the material self-making. The primary dynamic interaction of an autopoietic system is precisely the normative valuation of the circumjacent reality sustained by the three criteria. Thus, *autopoiesis* serves as a concept to distinguish living from nonliving matter by the process of instantiation of a material self-identity and not by the mere confluence of determined chemical-physical elements, i.e. the core feature of the living consists in the maintenance of a *form* or general process of self-establishment regardless of the underlying material components. Therefore, such dialectic notion of life can surpass the vitalism/mechanism dichotomy by arguing that life is not a transcendental vital force that takes over *res extensa* neither a pure linear decomposable causality. The material process of self-making is a teleological drive

directed to the perpetuation of a *form* which produces a self-referent corporeality that inaugurates a new realm of causality.

Autopoiesis is a prime example of such dialectics between the local component levels and the global whole, linked together in reciprocal relation through the requirement of constitution of an entity that self-separates from its background. In this sense, autopoiesis as the characterization of the basic pattern of the living does not fall into the traditional extremes of either vitalism or reductionism. (VARELA, 1997, p. 78).

With that in mind, one must understand life already - from the get going - as a process of cognitive activity. Therefore, the question about life is, in other words, the question about intentionality. This does not mean that consciousness is present all the way from the start. It simply expresses the fact that self-maintenance implies the normative discriminatory process of the environment. Thus, the general purpose of Varela can be finally outlined:

My proposal makes explicit the process through which intentionality arises: it amounts to an explicit hypothesis about how to transform this philosophical notion of intentionality into a principle for natural science. The use of the term cognitive here is thus justified because it is at the very base of how intentionality arises in nature. In brief, the term cognitive has two constitutive dimensions: first its coupling dimension, that is, a link with its environment allowing for its continuity as individual entity; second its interpretative dimension, that is, the surplus of significance a physical interaction acquires due to the perspective provided by the global action of the organism. (VARELA, 1997, pp. 80-81).

To naturalize intentionality demands the avoidance of vitalism and, at the same time, be aware to not reduce the living to the sum of its physical-chemical parts. That way, as Žižek points out, it is with Kant that surfaces the first sketch of the overcoming of such dichotomy: “Freedom’ is not simply the opposite of deterministic causal necessity: as Kant knew, it means a specific mode of causality, the agent’s self-determination. (ŽIŽEK. 2006, p. 203). Hence, the recognition of the kantian legacy is a must: “any discussion about teleology in science and western thinking altogether is inescapably grounded on the prodigious basis provided by Immanuel Kant.” (VARELA & WEBER, 2002, p. 98).

II.

It is crucial to highlight that “Kant introduced an unstable middle position” (VARELA & WEBER, 2002, 99). There is a noticeable hesitance in Kant. The argument for the use of teleology as a descriptive notion does not exclude mechanism as the possible ultimate explanation: “Kant neither ruled out mechanism, nor did he declare it to be ‘the real reality’ beneath the phenomena.” (VARELA & WEBER, 2002, 99). Nonetheless, Kant introduced - through the notion of natural purpose (*Naturzweck*) - a vision of life that inaugurates a non-resolved tension between mechanical and dialectical causality, making room for various interpretations and receptions of his thinking. In Kant, thus, remains “undetermined the question whether the finality [of an organism] is intentional or not.” (LEBRUN, 2002, p. 354)

Being an adherent to Newton-style physics, he nonetheless reserved for the organism another kind of thinking: the living was to be conceived in terms of natural purposes. This notion explicitly touches the self-organizing properties of living matter: it can be argued that Kant himself introduced the term “self-organization” in its modern sense into biological theory. Nonetheless the received view (in Neo-Kantism, but especially also in the Anglo-Saxon philosophical tradition) is a strong reductionism that allowed discourse about organisms “as if” they behave teleologically, but sees them in reality as strictly mechanistic. It is this reading that has been most influential today, which enthrones Kant as a father of reductionist biology. (VARELA & WEBER, 2002, p. 99).

Lebrun reinforces the thesis of Varela & Weber: “[Kant’s position] permits the choice between two very different interpretations of the living.” (LEBRUN, 2002, p. 356). Because of his reasoning that Kant is a sort of precursor to the idea of *autopoiesis*, Varela would surely agree on the following assessment also by Lebrun: “[...] the spontaneity (self-elaboration, self-preservation) is more than an ‘empirical adjunct’ to the concept of organism: it is what is on the foreground and, henceforth, what serves as the best description.” (LEBRUN, 2002, p. 345). In few words, the Kantian argument (as ambiguous as it is) of the irreducibility of life revolves around of the aforementioned notion of *Naturzweck* where the parts come together as a whole because of the process of self-making and not because of an exterior design of a particular God or cosmic principle that would serve as a vitalist

principle. Life is intrinsic-*telos* e not relative-*telos*, or rather, to live is to be the cause and effect of itself.

In such a product of nature, just as each part exists only as a result of all the rest, so we also think of each part as existing *for the sake* of the others and of the whole, i.e., as an instrument (organ). But that is not enough (for the part could also be an instrument of art, in which case we would be presenting its possibility as depending on a purpose as such [but not yet on a natural purpose]. Rather, we must think of each part as an organ that *produces* the other parts (so that each reciprocally produces the other). Something like this cannot be an instrument of art, but can be an instrument only of nature, which supplies all material for instruments (even for those of art). Only if a product meets that condition [as well], and only because of this, will it be both an *organized* and a *self-organizing* being, which therefore can be called a *natural purpose*. (KANT, 1987, p. 253, § 65).

One other point that serves to indicate the harmony of Kant and Varela is the distinction drawn between living organisms and artificial machines. In an artificial artefact, although we can spot a *form* that rises above from the parts, there isn't an organizational structure that maintains an unceasing self-making. The difference is obvious and crucial: if the parts do not interact in a reciprocal manner, we can't affirm that there is *Naturzweck*. In other words, a watch - put together by human imagination and volition - is teleological-relative; therefore, unable to serve as a true analogy to organisms: "In a watch, one part is the instrument that makes the others move, but one gear is not the efficient cause that produces another gear; [and hence] even though one part is there for the sake of another, the former part is not there as a result of the latter." (KANT, 1987, p. 253, § 65). The self-reference and the discrimination of the surrounding are intertwined with the process of self-making. *Autopoiesis* calls attention to the fact that what really stands out in the definition of life is the teleological process of keeping a *form* despite the ceaseless change of parts.

[...] the cause that produced the watch and its form does not lie in nature (the nature of this material), but lies outside nature and in a being who can act according to the ideas of a whole that he can produce through his causality. [...] one gear in the watch does not produce another; still less does one watch produce other watches, [by] using (and organizing) other matter for this [production]. It is also the reason why. if parts are removed from the watch. it does not replace them on its own; nor, if parts were missing from

it when it was first built. does it compensate for this [lack] by having the other parts help out, let alone repair itself on its own when out of order: yet all of this we can expect organized nature to do. Hence an organized being is not a mere machine. (KANT, 1987, p. 253, § 65).

That being said, when Kant argues that “nature organizes itself” (KANT, 1987, p. 254, § 65), it not only becomes perceivable the possible convergence with Varela, but also a point is reached where Kant must make clear that his position is distinct from hylozoism or dualistic vitalism.

[...] we must either endow matter, as mere matter, with a [kind of] property (viz., the property of life, as) hylozoism [does] that conflicts with its nature [Wesen]. Or else we must supplement matter with an alien principle (a soul) conjoined to it. But [that also will not work. For] if an organized product is to be a natural product, then we cannot make this soul the artificer that constructed it, since that would remove the product from (corporeal) nature. (KANT, 1987, p. 254, § 65).

Given the fact that Kant recognizes “the organization of nature has nothing analogous to any causality known to us.” (KANT, 1987, p. 254, § 65), that is, “once we grant as impossible the passage of an order to the other” (LEBRUN, 2002, p. 332), the defense of an intrinsic teleology appears - at first sight - to argue for some sort of hylozoism or vitalism. However, Kant rejects the assumption of a supposed qualitative indistinctiveness of Being as the only hypothesis able to encompass the ontological possibility of the emergence of self-organized beings. In a few words: “Leibniz went very far by populating the universe with souls. Kant refuses that.” (LEBRUN, 2002, p. 339).

If consciousness presupposes intentionality, it does not follow that intentionality presupposes consciousness. The fact that an *Umwelt* comes to be as a result of the self-distinction of a self-making totality does not imply the existence of consciousness in every level of life gradation. Therefore, the Kantian conclusion sustains that “the concept of natural purposes leads reason into an order of things that is wholly different from that of a mere natural mechanism, which we no longer find adequate when we deal with such natural products.” (KANT, 1987, p. 256, § 66). Drawing from Hegel, Lebrun puts it simply:

“The difficulty”, Hegel writes in the *Encyclopedia*, “comes from the fact that usually purpose is represented as extrinsic and, according to the prevailing opinion, purpose exists only under a conscious form.” It’s this difficulty that

the notion of natural end [*Naturzweck*] manages to overcome. Correspondingly, it would be over simplistic to see [in Kant] just the prefiguration of the vitalist attitude. (LEBRUN, 2002, pp. 346-347).

Certainly, there are no reasons to associate the *Critique of Judgement* to a pure vitalism nor a simple mechanism. The ambiguity of Kant is clearly shown when he speaks of *Naturzweck* as a normative auxiliary concept: “the concept of a thing as in itself a natural purpose is not a constitutive concept either of understanding or of reason. But it can still be a regulative concept for reflective judgment” (KANT, 1987, p. 255, § 65).

Thus, Kant has modest intentions in his famous §65. It all comes down to argue that self-organized beings “give natural science the basis for a teleology, i.e., for judging its objects in terms of a special principle that otherwise we simply would not be justified in introducing into natural science (since we have no *a priori* insight whatever into the possibility of such a causality).” (KANT, 1987, p. 255, § 65). The only true Kantian commitment is an epistemological one and not ontological. On the other hand, according to Varela & Weber (2002) the missing piece in Kant’s argument, as we shall see next, is provided by a particular strain in philosophy of biology that has Hans Jonas as its main proponent: “At the center of Jonas’ description stands the fact that organisms materially create themselves, a notion entirely parallel to the definition of autopoiesis proposed at about the same time Jonas formulated a comprehensive concept of his ideas.” (VARELA & WEBER, 2002, p. 113).

III.

The contemporary use of Kantian formulations from the third critique, in a general sense, is in search of reintroducing teleology at core of living beings without a return to animists or vitalists ontologies. The goal is to naturalize teleology starting from the fact that a qualitative change occurs when a particular pattern of matter maintains a *Gestalt* while ceaselessly replacing its parts. A naturalistic view of teleology does not imply a relapse into dualism. It’s a line of reasoning that finds in *autopoiesis* and the German school of biology its place.

And this kind of thought, that Apel (1963) has called the “apriori of the lived body” (*Leibapriori*), has taken 150 years to resurface in a new turn in

the philosophy of nature around 1960 in contemporary writers such as H. Jonas (taken here as emblematic), A. Portmann, R. Spaemann, and, (following his father Jacob von Uexküll), Th. von Uexküll. (VARELA & WEBER, 2002, p. 111).

For Varela & Weber (2002) the main contribution of Hans Jonas is his defense of the *metabolic process* as the crucial feature of life. Instead of talking abstractly about a ‘general process of self-making’, Jonas is focused on taking metabolism – as ordinarily understood in the biological science – as expand its meaning to provide an ontology of life: “a central question to examine from an empirical perspective is how an organism can realize its living. Jonas turned to the apparently simple fact of metabolism and elevated it to the core of the organism’s ontology. This is where his analysis joins directly with the autopoiesis approach” (VARELA & WEBER, 2002, p. 112). Furthermore, what is particularly interesting for the notion of life as *autopoiesis* is Jonas’ argument for the ontological preponderance of *form* over *matter* established by the metabolic process of the organism: “metabolism can very well be considered as the defining quality of life: every living being has it, no nonliving being has it [...] the particles of matter that make up the organism in each moment are only temporary and passing contents.” (JONAS, 1973, pp. 83 e 120). With that, Varela & Weber (2002) hold the view that the solution for the Kantian impasse resides in the natural sciences, as long as normativity and teleology are taken into account as natural processes. Thus, the antinomy of the teleological judgement is dissolved by assuming teleology as a natural aspect of self-making or metabolic systems. In order to point out the advance in Jonas’ position, Varela & Weber (2002) contrast it to Merleau-Ponty.

phenomenologists since Merleau-Ponty have repeatedly said that a phenomenological analysis of organisms entails a shift from conceptual categories to the roots of life itself. But this repeated invocation concerning “life” is left unexamined beyond its evocation. Organism is identified with life, and thus with the sphere of perception-action that so predominates the understanding of *Leib*. Jonas is unique in demanding that the analysis be carried to the minimal form of life, to its very origins, and to where it joins the autopoiesis account. It is from this minimal understanding that the qualities of autonomy and purpose can eventually be echoed in the multicellular organism endowed with a nervous system. (VARELA & WEBER, 2002, p. 112).

The pivotal role that Jonas reserves to metabolism is crucial to characterize life in harmony with the current scientific paradigm, however, “For a convincing naturalization of Kant, perhaps the only tool Jonas was missing was an empirical theory of self-organization and self-production.” (VARELA & WEBER, 2002, p. 114), which is precisely what *autopoiesis* try to offer: “Maturana and Varela formulated the notion of minimal autonomy as a circular process of self-production where the cellular metabolism and the surface membrane it produces are the key terms.” (Ibid., p. 115). The occurrence of a self-making system marks “the instauration of a *point of view* provided by the self-construction.” (Ibid., p. 116). Thus, the convergence of Jonas’ description with *autopoiesis* “makes these two lineages of thought not only contemporaneous but fully complementary.” (Idem).

IV.

The adoption of *autopoiesis* means the overcoming of Kant’s hesitation. The notion of a self-making and self-maintainer system implies the introduction of teleology within basic forms of life. Kant’s *Naturzweck*, with all its originality and conceptual anticipation, still leaves room for divergent interpretations. The work of Maturana and Varela tries to improve Kant’s description of the organism while within the scientific biological paradigm. The qualitative realm that emerges with an autopoietic system does not contradict or deny the basic fact that life is a contingent product arising from physical-chemical processes during the geological process of a given planet.

The story we are sketching is the account of sequences that occur in an inevitable manner, and one would only be surprised with the result if they did not have access to the entirety of the historical sequence. One of the most classic evidences that there is no discontinuity in this gradual transformation through stages was provided by an experiment carried out by Miller in 1953 [...] Miller’s idea was simple: Miller’s idea was simple: to place an atmosphere in a laboratory flask that mimics the primitive geological conditions, both in composition and in energetic radiation. He put it into practice, causing an electrical discharge to pass through a mixture of ammonia, methane, hydrogen and water vapor. The results of molecular transformations can be obtained through water recirculation and analysis of the observable dissolved substances. To the surprise of the entire scientific community, Miller achieved an abundant production of molecules typically found in today’s cellular organisms, such as the amino acids alanine

and aspartic acid and other organic molecules such as urea and succinic acid. (VARELA & MATURANA, 2001, p. 53)

Since *autopoiesis* operates within the parameters of Darwinian thinking, the only thing left to do is to think of life as an “embodied teleology” (VARELA & WEBER, 2002, p. 117) that emerges from random natural processes: “The separation of the realm of pure natural science from the realm of values, so popular since Neo-Kantianism, has to be abandoned; instead a theory of embodied meaning has to be reintroduced into the science of the living, paying central attention to categories as value and subjectivity.” (Ibid., p. 117). The, let’s say, naturalization or embodiment of *meaning*, is a consequence of the self-reference of a *form* that discriminates the environment in order to keep it going. In other words, when a *Naturzweck* comes to be the *milieu* is unveiled in relation to the vital or existential needs of the self-making material system.

An autopoietic system is necessarily referred to itself: its actions consist in establishing the dynamical processes of staying alive. Stimuli from outside enter the sphere of relevance of such a unit only by their existential meaning for the keeping of the process of self-establishment. They acquire a valence which is dual at its basis: attraction or rejection, approach or escape. Form, then, is not just an abstract goal in a genetic program, but a material task to fulfil from moment to moment. (VARELA & WEBER, 2002, p. 117).

The preponderance of *form* is not an endorsement of a distinct ontological realm. The *form* is the aim of the material-teleological processes of self-maintenance. This urge is not conscious. Intentionality is not synonymous to consciousness. To enact an *Umwelt* is a normative unfolding of a material process: “the organism creates a perspective which changes the world from a neutral place to an *Umwelt* that always means something in relation to the organism.” (VARELA & WEBER, 2002, pp. 117-118).

The normative valuation of the surroundings comes from the original valuation of oneself: “The fundamental point of departure is that life says “Yes!” to itself. In wishing itself to continue it declares itself as a value”. (JONAS, 1992, p. 87). In the same way, the Heideggerian based critique formulated by Hubert Dreyfus towards the cognitivist approach in Artificial Intelligence also touches on this point: “attributing functions to brute facts couldn’t capture the meaningful organization of the everyday world”. (DREYFUS, 2007, p. 247). Cognition, fundamentally, is not rooted on a collection

of facts or a systematization of predicates about the world, but in the coming about of an existential stance that marks the living aspect of an arrangement of matter.

For Heidegger, who claims our commonsense understanding is a kind of knowing-how, not a propositional knowing-that, things look even more discouraging for cognitivism. Since our familiarity does not consist in a vast body of rules and facts, but rather consists of dispositions to respond to situations in appropriate ways, there is no body of commonsense knowledge to formalize. The task is not infinite but hopelessly misguided. [...] Facts and rules are, by themselves, meaningless. To capture what Heidegger calls significance or involvement, they must be assigned relevance. But the predicates that must be added to define relevance are just more meaningless facts; and paradoxically, the more facts the computer is given the harder it is for it to compute what is relevant to the current situation. (DREYFUS, 1991, pp. 117-118).

With that, one can conclude with Varela & Weber that “Life is thus always subjective in the strong sense of the word.” (VARELA & WEBER, 2002, p. 118), that is, the investigation on life is, *mutatis mutandis*, an investigation on intentionality and vice versa:

Only a small part of all dynamics in the environment enter as perturbations into the domain of relevance of the organism. All other possible interactions just fall outside of the possibilities of experience of the system. Only that which influences the steady state of the organisms is real – just because it has such an influence. It follows that every contact with the world has, for the organism, an existential meaning. (VARELA & WEBER, 2002, p. 118).

This insight was already foreseen by Merleau-Ponty in his description of the ontological consequences of thinking of the body as the locus of perception. In the preface of *Phenomenology of Perception*, Merleau-Ponty plays with Jean-Paul Sartre’s existentialist motto (‘we are condemned to freedom’) to display the conclusion of his phenomenological investigation of perception: “we are *condemned to meaning*.” (MERLEAU-PONTY, 2005, p. xxii).

Meaning is inescapable. To be alive is to enact a world of relevant features. The complete void of significance is not optional. Pure nihilism is unreachable. At best, it is a formal philosophical conclusion that a fully formed human being can have when discussing the non-existence of God and the lack of an ultimate moral standard. But even the most radical of nihilists are still within the

dynamics of sense-making because the grasping of a world of significance is not volitive, it is the unfolding of the sheer fact of being alive:

Only in the light of the “desire” of the living, does the world gain structure and gestalt, and those are only understandable in the light of these existential needs. A world without organisms would be a world without meaning; and it is in life’s incessant need, that a subjective perspective is established. Subjectivity is the absolute interest the organism takes in his continued existence. [...]To live means to say yes to oneself emphatically as the basic movement of existence, because existence is always existence of form on and against pure matter.” (VARELA & WEBER, 2002, pp. 118-119).

CONCLUSION

Varela & Weber (2002) are very aware of the limits of Kant’s § 65 in the *Critique of Judgement*. However, despite the clear incompleteness of Kant’s account, the authors admit that “In the end, what we rediscover here is not so different from what Kant meant” (Ibid., p. 120). What is missing in Kant is brought to completion with *autopoiesis* and Jonas’ metabolism: “autopoiesis is the necessary empirical ground for Jonas’ theory of value. Together both theories give an empirical background for the Leibapriori found in the late works of Kant, and together they can resolve the aporias about organic purposefulness in the Critique of Judgement.” (Idem). That being said - and it was not the intention of the paper to discuss this claim in detail - one can affirm that this is at least a disputable thesis. In other words, despite the originality of Kant’s *Naturzweck* it is possible in our view to see *autopoiesis* as a non-Kantian account of life. At any rate, the unquestionable conclusion that one can draw from the discussion that goes from Kant to *autopoiesis* is that “Teleology, understood as intrinsic teleology, turns out to be an empirical feature of an organism, its *sine qua non* condition.” (Idem). Thus, every account of life that’s worth examining must go through Kant.

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