

MIND IN NATURE, NATURE IN MIND: A REPLY TO ULE

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ABSTRACT

This article is a response to Ule's ideas on the (im)possibility of naturalizing the mind. After providing a brief overview of some of the main inconsistencies in Ule's account, I argue that a naturalistic explanation of the key feature of the mind as construed by Ule ("experiential perspectivity") is, in fact, feasible, but only if it is complemented by an equally important shift in our conception of nature. The central part of the article consists of two steps. First, following the line of thought developed (predominantly) by Jonas and Varela, the article attempts to outline a route to the naturalization of "perspectivity" along the lines of the so-called autopoietic theory and the corresponding double dialectic of identity and sense making. Secondly, I emphasize that this is merely the first half of the story, and that the second element in Ule's construal of the mind, "experientiality", cannot be explained within the metaphysical framework of modern naturalism, but calls for a radical restructuring of our field of inquiry in terms of the fundamental circularity between lived experience and scientific endeavour. Thus, the process of the naturalization of life and mind needs to be reciprocated by the process of the phenomenologization of nature and reconceptualization of naturalism.

KEY WORDS

mind, life, naturalization, phenomenologization, reduction, autopoiesis, Jonas, Varela

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THE SPECTRE OF NATURALIZATION

For the past century, the question of the naturalization of the mind has been in the forefront of scientific and philosophical debate. The question is an extremely difficult one, plagued with a range of thorny metaphysical and epistemological issues, not least because “naturalization” and “naturalism” are frequently conflated with “reduction” and “reductive physicalism”. The main aim of the article is not to unravel these philosophical knots *in toto* – a daunting, if not impossible task – but to try and shed light on one of the multitude threads that constitute this complex theoretical fabric. Specifically, it intends to first underline and then undermine some of the conclusions about the (im)possibility of naturalizing the mind as propounded by A. Ule in his article “Some Reflections on the Possibility of Naturalizing the Mind” [1]. In so doing, it hopes to show that certain vistas that have been overlooked by Ule might provide answers to at least some of the objections raised in his critique and house interesting possibilities for the naturalization of life and mind. These possibilities have far-reaching implications, and I will try to delineate some of the more pertinent ones, but without providing an exhaustive treatment of the subject. In this regard, the article is intended more as food for (additional) thought, and not as a comprehensive solution to the problem.

With this introductory proviso in place, let us now turn to the matter at hand. In his article, Ule argues against the possibility of naturalizing the mind (or spirit)¹. After a brief examination of three different attempts at naturalization – Bateson’s system theory of mind, Pierce’s theory of semiotics, and theories based on the concept of biosemiosis – he goes on to claim that they all fall short on at least two counts: first, they are unable to explain how minds, construed primarily as “semiotic” or “information systems”, might have emerged from the “inanimate” and “causally-determined nature” [1; p.506] (“*genealogical*” aspect); secondly, and more importantly, they are unable to account for the “experiential perspective” in living beings (“*metaphysical*” aspect):

“To have an experiential perspective is, in my opinion, a necessary condition for the emergence of higher forms of semiosis, forms that include complex perceptions of different life situations and anticipations of possible future occurrences, e.g. an ability to anticipate how other organisms would react to one’s behaviour in a given situation. It should be emphasized that having a personal experiential perspective doesn’t necessarily entail being conscious of oneself, having an idea of the self, etc.” [1; p.507].

Unfortunately, Ule’s construal of the notion of “experiential perspectivity” is rather opaque. On the one hand, it seems to designate “a discriminative capacity” that enables living beings “to perceive and evaluate situations that are relevant for them from the point of view of the informational system as a whole” [1; pp.502-503], i.e. “an ability of an organism [...] to form a center of sense impressions that might serve as a starting point or a central referential point in the evaluation of not only potential, but also actual events in the environment of that organism” [1; p.507]. On the other hand, experiential perspective is said to “necessitate the existence of the so-called *qualia*, i.e. the irreducible qualities of those feelings that, according to the representational view, are located ‘inside’ of an organism (or on its bodily surface)” [1; p.507]. Thus, the overall picture seems to oscillate between a “functionalist” (third-person) and a “qualitative” (first-person) account, leaving the reader wondering why, and how, the two are related. In fact, the author himself seems to be raising precisely this issue when, referring to the qualitative aspect, he points out that “[t]hese feelings [i.e. qualia] cannot be fully reduced to representations of the objective state of affairs that lacks any kind of experiential perspective” [1; p.508]. Although important, I will not pursue these inconsistencies here, but will simply assume that the concept of “experiential perspectivity” encompasses

both aspects: (a) the ability to (i) establish and maintain a “center” or “central referential point” capable of (ii) realizing meaningful relations with its environment (*perspectivity*); and (b) the qualitative or phenomenal character associated with (a) (*experientiality*).

Unsatisfied with the three approaches, Ule goes on to sketch an alternative account of the mind’s place in nature, suggesting that “in addition to time-space dimensions, the material reality itself (i.e. the material cosmos) must also possess the perspectivity dimension, i.e. the real capacity of acquiring more or less pronounced experiential perspectives of the type ‘like to be X’ for all sufficiently developed natural beings” [1; p.508]. In his view, “experiential perspectivity” is part of the furniture of the world (of “what there is”), and thus irreducible to spatio-temporal configurations of physical entities. Being an “ontological primitive”, an essential ingredient of our fundamental ontology, it is simply wrong to assume that its properties might be deducible from physical properties. Now, although it might be claimed that the proffered solution does, in a way, solve the reality of the experiential domain, the solution comes at a high price. First of all, it is *not* really an *explanation* (at least by materialist’s standards), but merely a *postulate*: it does not try to *account for* the phenomenon in question, but merely *posits* its existence. This, in itself, is not problematic (one is free to opt for whatever metaphysics one finds philosophically the most palatable), but it is problematic in light of Ule’s claim that “experiential perspectivity” must be understood as an addition to, or extension of, “the materiality itself”. So, not only is it an addition to the standard set of physical properties (materiality *plus* experientiality), but is actually said to constitute one of the defining features of materiality itself. However, if this were so, it is very peculiar that *most* of the physical world *does not* exhibit any trances of perspectivity and experientiality, whereas *all* creatures that are said to possess interiority *are* (also?) physical.

This brings us to what I see as the second shortcoming in Ule’s account, for even if we did accept that the fundamental furniture of the world needs to be extended with an additional set of properties, it would still remain unclear as to why this additional set should be limited exclusively to “all sufficiently developed natural beings”. If the added set is, indeed, an *elementary* ontological ingredient of “material cosmos”, one would expect it to be present in *all*, and not only in *some*, of its entities. There are, of course, good *empirical* reasons to attribute interiority to “sufficiently developed” beings, especially “organisms with brains” [1; p.507], but since Ule explicitly refuses “a panpsychist system of any sort” [1; p.508], he is forced, on pain of being deemed inconsistent, to provide *some criteria* as to why interiority is (supposed to be) found only in this particular class of beings and not in any others. However, given that “experiential perspectivity” is taken to be an ontological primitive and thus *independent* of physical properties, i.e. its emergence and features cannot be explained by arrangements of physical objects, it is far from clear how Ule intends to solve this problem. Although he does admit that he is currently unable to assess “just how far ‘back’ into animate or inanimate matter this [experiential perspectivity] actually goes”, an even more important question is whether such an explanation is possible *in principle*. In this regard, panpsychist solutions [2, 3] actually turn out to be *more* plausible, as they consistently ascribe the new ontological *positum* to the *whole of reality* (thus avoiding problems with seemingly random circumscription of experiential properties to a certain group of living beings only).

But I feel that there is yet another, and much more important, sense in which Ule’s account is mistaken. Namely, I intend to show that certain developments in the field of philosophy of biology and philosophy of mind provide a theoretical and pragmatic framework that might enable us to tackle the problem of the naturalization of the mind from a different angle. In what follows, I will therefore argue that a naturalistic account of the mind *broadly* (!) construed in terms of systems theory is feasible, *provided* it is followed by a complementary, and equally important, shift in our conceptualization of, and approach to, nature. I will

proceed in two steps. First, I will try to show how “perspectivity” might be accounted for in the framework of the so-called autopoietic theory and the corresponding double dialectic of identity and sense making, as proposed by Varela. Secondly, I will argue that this is merely the first part of the story, and that the second aspect of Ule’s *positum*, “experientiality”, cannot be explained within the metaphysical framework of modern naturalism, but necessitates a radical reformulation of our field of inquiry by embracing the fundamental circularity between first-person (lived experience) and third-person perspectives (science). Thus, the process of the *naturalization of life* and mind needs to be reciprocated by the process of the *phenomenologization of nature*, which entails not only slight modifications in, but a radical reconceptualization of, nature and naturalism [4].

BETWEEN NATURALIZATION ... (PERSPECTIVITY)

The first thing that needs to be pointed out is that there exists an important similarity between the “genealogical” and “metaphysical” aspect, namely they are both answers to the question how. But whereas the former inquires into the temporal beginnings of a given phenomenon (how did A’s historically evolve from B’s), the latter studies the criteria that need to be fulfilled in order to be able to account adequately for a given phenomenon (what parameters need to be satisfied in order for A’s to adequately explain B’s). The first question, the question of the “mystery of origins”, seems unanswerable – “it is”, as Jonas puts it, “closed to us” [5; p.3]. In this regard, Ule’s account does not fare any better than the three theories he criticizes (as well as their expansions, e.g. Deacon and Sherman’s auto-cells), for even if it did turn out that mentality is an ontological primitive and hence irreducible to physical properties, we would still have to provide an explanation as to how this state of affairs came to be: Was mentality present already at the very conception of the Cosmos? If so, “where” was it before sufficiently complex organisms entered the evolutionary picture? If not, when – and why – did it come into being?, etc. The point is that the question remains (for now and possibly forever) shrouded in mystery, so that all we are left with are mere speculations. It is for this reason that the rest of the article will focus exclusively on the “metaphysical” aspect.

It was mentioned earlier on that one of the characteristic features of (sufficiently complex) living beings is perspectivity, and that the latter consists in the ability to establish and maintain a central (reference) point (i.e. interiority) which, in turn, enables meaningful relations with the environment (i.e. exteriority). But what aspect of material nature, what set of inanimate processes, might account for, or at least shed light on, this fundamental interplay between “inside” and “outside”, between the organism and its surroundings? Hans Jonas, in his classical piece *The Phenomenon of Life* [5], provides an interesting answer to this question, suggesting that the crucial role should be attributed to – metabolism:

In this remarkable mode of being [i.e. metabolism], the material parts of which the organism consists at a given instant are to the penetrating observer only temporary, passing contents whose joint material identity does not coincide with the identity of the whole which they enter and leave, and which sustains its own identity by the very act of foreign matter passing through the system, the living *form*. It is never the same materially and yet persists as its same self, *by not remaining the same matter* [5; pp.75-76].

In other words, metabolic processes enable the organism to constitute itself as an individual identity (stable “organic form”) against the constant flux of its material constituents (everchanging “matter”). However, animate organic wholes are not to be conflated with inanimate dynamic wholes, since their individuality does not reside only in the eye of the beholder, but is their own “concern” and their own “achievement”, i.e. they are [s]ystems of matter that are unities of a manifold, not in virtue of a synthesizing perception whose object

they happen to be, nor by the mere concurrence of the forces that bind their parts together, but in virtue of themselves, for the sake of themselves, and continually sustained by themselves. Here wholeness is self-integrating in active performance, and form for once is the cause rather than the result of the material collections in which it successively subsists [5; p.79]. In this dynamic process the organism not only constitutes itself as an individual unity, but also delimits that which it is not: its “self-isolation” sets it “against the rest of things”, against the world [5; p.83]. Thus, a basic polarity of interiority and exteriority, of “self” and “world”, is brought into existence:

In this process of self-sustained being, the relation of the organism to its material substance is of a double nature: the materials are essential to it specifically, accidental individually: it coincides with their actual collection at the instant, but is not bound to any collection of instants [...]. Dependent on their availability as materials, it is independent of their sameness as these; its own, functional identity, passingly incorporating theirs, is of a different order [5; p.80].

Hence, the fundamental relation between the organism and its environment consists of what Jonas refers to as “needful freedom” [5]. By constituting itself as an individual unity, the organism gains a certain amount of independence from the environment; but in order to preserve this relative autonomy it must constantly maintain specific relations with its surroundings. In other words, “organic form” constitutes itself against, but is not completely independent of, “matter”: “The *privilege of freedom* carries the *burden of need* and means *precarious being* [5; p.4].” The relation between organic form and matter is thus profoundly *dialectical* in nature:

On the basic level, that defined by metabolism, this double aspect shows in the terms of metabolism itself: denoting, on the side of freedom, a capacity of organic form, namely to change its matter, metabolism denotes equally the irremissible necessity for it to do so. Its ‘can’ is a ‘must’ since its execution is identical with being [5; p.83].

Perspectivity, then, is the end result of this metabolism-based “hazardous independence” of organisms, whose “precarious being” perpetually oscillates between freedom and necessity, form and matter, being and not-being [5; p.3]. Hence, it is not something limited exclusively to higher forms of life, but manifests itself already at its very roots, at “the basic level of all organic existence” [5]. It is, in other words, a fundamental and universal feature of the mode of being that is characterized by *concern* for itself, by *relationality* and *transcendence*: “[L]ife is essentially relationship; and relation as such implies ‘transcendence’, a going-beyond-itself on the part of that which entertains relation” [5; pp.3-4]. Living being is a *pulsating polarity*, constantly torn between its self-subsisting identity and that beyond, which forms its horizon of ruthless necessity and indefinite possibility.

However, Jonas’ account, though intriguing, is incomplete. What it lacks, is a comprehensive model that would explain how metabolism instigates this back-and-forth (circular) dynamic between organic form and matter. The missing explanatory link, as I will try to show, is provided by Maturana and Varela’s theory of autopoiesis, an important and much needed complement to Jonas’ stimulating, but essentially conjectural proposal. Maturana and Varela are in full agreement with Jonas when they state that life is not so much a matter of chemical composition, reproduction, and so on, as it is a *matter of organization*, a *matter of form*. But *what kind* of organization? What is it about the animate organic form that distinguishes it from inanimate assemblies of matter? According to Maturana and Varela, that which characterizes living beings is their ability to *continually self-produce* [6; p.43]. An *autopoietic (self-producing) system* is a *self-organizing system* defined by a double dialectic²: *dialectic of identity* (parts – whole) and *dialectic of sense-making* (interiority – exteriority) [7].

Let us look at each in turn.

First and foremost, an autopoietic system is “organized as a self-producing network of processes that also constitute the system as a topological unity” [8; p.115]. Take, for instance, the basic unit of life: a living cell. On the one hand, *cell metabolism* produces molecular components that constitute a network of dynamic interactions, some of which are responsible for the production of a semi-permeable *cell membrane*. On the other hand, the cell membrane houses these molecular components, thereby reciprocally enabling the proper functioning of cell metabolism and preventing structured chemical interactions from disintegrating into a “molecular mess” [6; p.46]. What is crucial here, is that the dynamic network of molecular interactions and the boundary housing them are actually *parts of the same process*: metabolic processes creates the membrane, which in turn (reciprocally) enables and co-constitutes metabolism (see Figure 1).

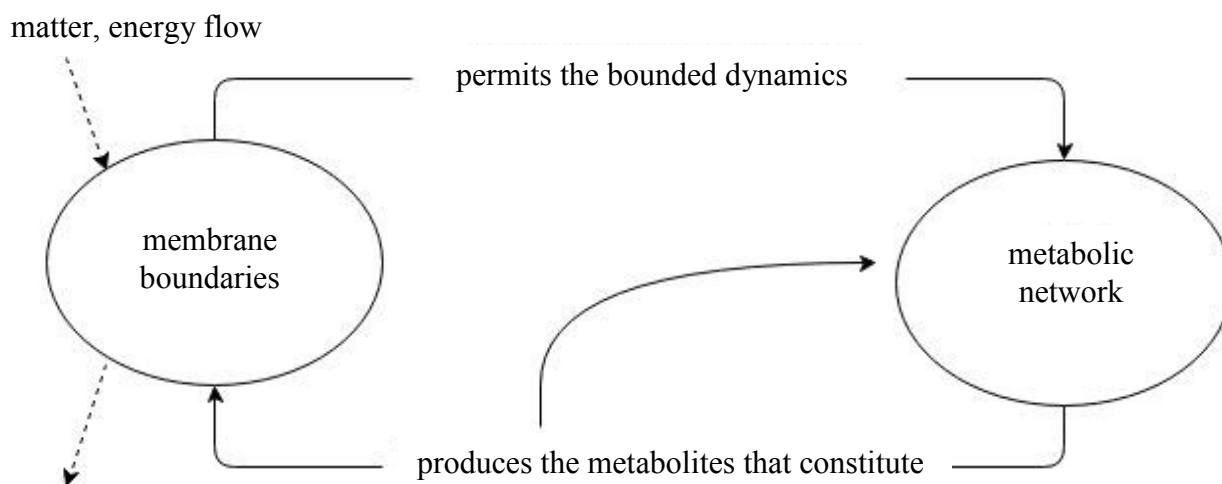


Figure 1. Schematic representation of the autopoietic closure of the living cell [9; p.75].

The first dimension of autopoiesis – whose main vehicle is, as correctly surmised by Jonas, metabolism – can thus be construed as a biological dialectic between *parts* and *the whole*, between *local* interaction rules pertaining to the individual components and *global* properties of the emergent whole (or what Ule might refer to as “central referential point”): on the one hand, the network of molecular interactions constitutes a distinct, discrete unit (cell); on the other hand, the emergent unit combines structural constituents (molecular components) into a dynamic network of interactions [10; pp.31-32]:

Metabolic processes within the cell determine these boundaries [e.g. the cell membrane], but the metabolic processes themselves are made possible by those very boundaries. In this way cell emerges as a figure out of a chemical background [11; p.99]³.

The Autopoietic self-organization constitutes living beings as *autonomous units*, i.e. it enables them “to specify [their] own laws, what is proper to [them]” [6; p.46]. This “circular, closed, self-referential characteristic” of autopoietic systems is known as *organizational* or *operational closure* [10; p.33], and refers to the fact that all changes occurring in an autopoietic unit are determined by their internal dynamics and not by external factors: “[E]very constituent process is conditioned by some other process in the system” [12; p.24]. Note, however, that “closure” is not the same as “closedness” or “isolation”: autopoietic systems as autonomous organizations are *operationally closed*, but *thermodynamically open*. In other words, an autopoietic system is involved in an on-going exchange of matter and energy with its environment, while at the same time maintaining its identity by regulating the network of its self-constituting processes.

The *dialectic of identity* can thus be understood as an *on-going circular process*, in which “a cell produces its own components, which in turn produce it” [11; p.98]. It defines autopoietic systems as: (i) *autonomous* (all changes that happen in the system serve to preserve its self-organization); (ii) *individualized* (by preserving its self-organization, the system actively preserves its identity); (iii) *units* (the self-constituting processes of the system define the system’s boundary); and (iv) *operationally closed* (external perturbations can trigger, but cannot determine, internal structural changes) [13; p.226].

Let us now move on to the dialectic of sense-making. The first dialectic, as we have seen, deals with the relationship between an organism and its components; the second dialectic, on the other hand, deals with the relationship between autopoietic systems and their environment. As Varela points out, what immediately strikes the eye is that autopoietic units are characterized by an intriguing *paradoxicality*:

[T]he living system must distinguish itself from its environment [operational closure], while *at the same time* maintaining its coupling [thermodynamic openness]; [however], this linkage cannot be detached, since it is against this very environment from which the organism arises, comes forth [14; p.7].

One cannot but note striking similarities with Jonas’ characterization of “needful freedom”: By constituting itself as a unit, the autopoietic system engenders its *interiority* and, at the same stroke, delineates its *exteriority*, i.e. that which counts as *the other* and thus remains *outside* of it. But this newly constituted alterity – and here comes an important addition to Jonas’ original account – is not neutral: the maintenance and regulation of autopoietic organization requires structural coupling between the inside and the outside, which means that, for an organism, some interactions – those pertinent for preserving its structural coherence – are more important than others. Preservation of identity thus brings forth a *certain perspective*, an environment – *for – the – organism* (“environment for the system” in Varelian terminology) as distinct from the environment – *for – the – observer* (“environment of the system” in Varelian terminology). By distinguishing itself from, and constituting itself against, its “surroundings”, the autopoietic system simultaneously gives rise to its world, milieu or niche [15].

Unlike the physicochemical environment (environment – for – the – observer) the world (environment – for – the – organism)⁴ is “a place of salience, meaning and value”, a place “of attraction and repulsion, of approach and escape”⁵ [12; p.25, 16; p.386]. To illustrate this, consider the example of motile bacteria swimming uphill in a food gradient:

The cells tumble about until they hit upon an orientation that increases their exposure to sugar, at which point they swim forward, up-gradient, toward the zone of greatest sugar concentration. Sugar is significant to these organisms and more of it is better than less because of the way their metabolism chemically realizes their autonomous organization. *The significance and valence of sugar are not intrinsic to sugar molecules; they are relational features, tied to the bacteria as autonomous unities.* Sugar has significance as food, but only in the milieu that the organism itself enacts through its autonomous dynamics [12; pp.24-25].

Bacterial chemotaxis is a minimal, but highly illustrative example of how a living being as an autonomous system gives rise to its own niche, its “environment of biological significance” [11; p.153]. *Sugar, in itself*, is devoid of meaning; its “surplus of significance” [17] – its valence is inextricably linked to a *unique perspective* of an individual organism. In other words, sugar can be perceived as a *nutrient* merely from the perspective of a bacterium as an autopoietic unit:

Physical and chemical phenomena, in and of themselves, have no particular significance or meaning; they are not “for” anyone. Living beings shape the [environment] into meaningful domains of interaction and thereby bring forth their own [worlds] of significance and valence [11; pp.153-154].

According to the theory of autopoiesis, it is precisely this *sense-making*, this bringing forth of a world, that forms the essence of *perspectivity*. On this view, and in line with Jonas’ account, perspectivity is not a specifically human, but a *universal biological quality*: it is common to all living beings, from the simplest bacteria to the complex vertebra, and consists of a two-sided process in which a living being as an autonomous system brings forth itself and its world. In other words, perspectivity (*pace* Ule) is not limited exclusively to creatures with a central nervous system, but is incorporated into the very fabric of life; furthermore, it is not limited to the system’s internal states, but is a relational process taking place between the system and its world (in Jonasian terms, it is characterized by relationality and transcendence).

In short, the *dialectic of sense-making* could be characterized as the “dynamic co-emergence of interiority and exteriority” [11; p.79]: by establishing itself as an autonomous unity, an autopoietic system simultaneously gives rise to its world, i.e. its domain of meaning, significance, and value. Note that sense-making is not to be construed as *homeo-stasis*, but rather as *homeo-dynamis*: in order to preserve its autopoietic structure, an organism must endlessly enact structural alterations, i.e., it must engage in an on-going dynamis, for any cessation of activity, any stasis, leads to disintegration and death. In Jonas’ words: “Once it [the living form] becomes the same with the sameness of its material contents – if any two ‘time slices’ of it become, as to their individual contents, identical with each other and with the slices between then – it ceases to live; it dies [...]” [5; p.76]. The autopoietic system is forced to constantly re-assert its individuality through meaningful couplings with its environment: *preserving* the structural coherence between the inside and the outside is thus, strictly speaking, always a matter of *re-establishing* it, of *re-creating* it, instead of simply maintaining it.

To recapitulate: A living being as an autopoietic system can be construed as an embodiment of a double dialectic:

- a) *dialectic of identity* (parts-whole): dialectic between *local conditions* (network of metabolic interactions) and the global autonomous entity (cell as a membrane-bound unit);
- b) *dialectic of sense-making* (interiority-exteriority): dialectic between the *emergent* (minimal) *self* and *its world* (the domain of valence and meaning) [7].

Note that these are not two separate processes, but *two aspects of the same process*. A global autonomous entity, constituted against the background of a network of metabolic interactions (operational closure), brings forth a world (surplus of significance); this world, in turn, delineates meaningful domains of interaction that are crucial for the undisturbed functioning of the metabolic network, and thus provides conditions facilitating the perpetual (dynamic) reassertion of the organism’s autonomy (thermodynamic openness). The process itself is profoundly paradoxical: bringing forth a world is an attempt at re-establishing appropriate coupling with the environment so as to preserve the organism’s organization (“burden of need”); but in re-asserting itself as an autonomous unit the organism separates itself from the environment, thus giving rise to its distinct world (“privilege of freedom”) [7; p.87]. Moreover, and as already hinted above, this fundamental double dialectic does not apply solely to the basic organic level, but can be also found in higher life forms. That is to say, all other dynamisms of life (neuro-logic, enacto-logic, etc.) are structurally similar to, and genealogically originate from, the fundamental bio-logic [7, 9, 14].

The double dialectic of identity and sense-making thus provides a general framework for the naturalized conception of perspectivity, in that it accounts for both criteria mentioned by Ule:

it shows (i) how the organism constitutes and maintains itself as an autonomous whole, and (ii) then how, in turn, this autonomous “referential point” engenders meaningful relations with its environment and hence gives rise to its world. This claim, however, merits further qualification. Later research on the topic [18-21] suggests that the notion of autopoiesis, at least in its original conception, is indeed a *necessary*, but not a *sufficient* condition for life, primarily on account of its inability to explain purposiveness and normativity [8]. One might feel that this throws a dire light on our project, as it seems to undermine the prospect of constructing a viable naturalistic account of perspectivity.

Here, two things bear pointing out: first, most critics do not dispute the validity of the fundamental bio-logic as construed above, but simply argue that the original conception fails to meet its theoretical requirements and therefore needs to be refined and improved upon. For example, Di Paolo [19, 20] points out that minimally autopoietic systems exhibit a rigid, conservative, all – or – nothing type of self-preservation (life vs. death) that leaves no room for more flexible, dynamic gradations in viability (e.g. becoming, development, health; fatigue, sickness, stress) that are needed for sense-making. For this reason, he suggests that “autopoiesis” has to be coupled with “adaptivity”, a complex capacity that enables the organism to regulate its states and activities in relation to conditions of viability in the environment and attend to them through self-generated norms of activity, which allows the organism “to avoid risky situations and seek preferable ones” [19; p.438]. Note, however, that Di Paolo’s contribution is not intended as a *substitute for*, but rather as a *complement to*, the original autopoietic theory. Similarly, Thompson speaks of autopoiesis “in a broad sense that includes adaptivity” [8; p.116], suggesting that these modifications are actually enrichments of the original idea.

Moreover, Froese and Stewart [21] argue that, from the time of its inception in the 1970’s, the concept of autopoiesis has undergone significant shifts in emphasis and meaning, so that, when using the term, it is advisable to at least distinguish between “Ashbyan” approaches, i.e. more *static* approaches that are rooted in the classical cybernetic framework, and “Kantian” approaches, i.e. more *dynamic* approaches that are based on the complexity theory. This goes on to show that “autopoiesis” itself is not (yet?) a fixed model [20], but rather an open-ended concept that is being continually refined with recent findings (e.g. the development of the above mentioned complexity theory) and appropriately modified to accommodate for some of the shortcomings and/or discrepancies of the classical model (e.g. the realization that intrinsic self-production can be instantiated only in far – from – equilibrium systems such as dissipative structures). The specifics change, but the fundamental idea (the skeletal bio-logic) remains roughly the same – and it is the latter that we are interested in.

The second point is related to, and builds on, the first one. Although most critics agree with the validity of the theory of autopoiesis construed as a formalized description of the living, it still seems that the overall account is leaving something out. Namely, despite its ability to explain perspectivity in terms of systems and complexity theory, the autopoietic approach ultimately remains an abstract, third-person theory that is unable to account for “the lived presence of the living being itself” [21; p.10]. Varela, in his later works, has become painfully aware of this, and has repeatedly called for the de-enchantment of the abstract and the *re-enchantment of the concrete* [22, 23]. The skeletal bio-logic – as well as its structural derivative, skeletal neuro-logic [9, 17] – help us approach just one aspect of the organism’s *embodiment*, namely its *perspectivity*, but does not touch upon an equally, if not even more important aspect, namely its *experientiality*. Hence, it might be argued, that even if autopoiesis does, in fact, provide a naturalistic account of the perspectivity dimension, the naturalization process as such is ultimately bound to fail, as it leaves out one of the central aspects of (at least some forms of) life – its (their) experiential/phenomenological dimension.

... AND PHENOMENOLOGIZATION (EXPERIENTIALITY)

This brings us to the second aspect of Ule's criticism, namely the claim that no naturalist account is capable of successfully explaining experientiality and that the latter should therefore be invested with the status of an irreducible ontological primitive. I would like to approach this issue by asking what it actually takes for us to know life, i.e. what are the *conditions of possibility* of learning what life is? In Thompson's words [16; p.393]:

Consider the question, how is it that we are able to recognize or comprehend the form or dynamic pattern of autopoiesis in the first place? Would this pattern be recognizable from some ideal objective standpoint? Or is it rather that we're able to recognize this pattern only because it resembles the form of our own bodily selfhood which we know first-hand?

Jonas phrased this problem in terms of whether life could be perceived by "the mathematical God". He concluded that, from a strictly analytical standpoint (i.e. Nagel's "view from nowhere"), a living being, that "apparent sameness and individuality of the organic whole", would disintegrate into "a series, or a web of many series, of consecutive [physico-chemical] events concerning these single, persisting units of general [material] substance", and hence, "all the features of a self-related autonomous entity would, in the end, appear as purely phenomenal, that is, fictitious" [5; pp.77-78]. The disembodied, analytical view of "the Great Mathematician" is destined to miss the crucial point, the point of life itself: its being self-centered individuality, being for itself and in contraposition to all the rest of the world, with an essential boundary dividing 'inside' and 'outside'. [...] This is the advantage we poor mortals have over [...] mathematical God: happening to be living material things ourselves, we have our self-experience, as it were, peepholes into the inwardness of substance [5; p.79, 5; p.91].

This is what has led Jonas to proclaim tersely: "[L]ife can be only known by life" [5; p.91]. It is only because we ourselves are embodied beings with own (lived) interiority and selfhood that we are capable of grasping the fundamental dynamic of autopoiesis, the bio-logical dialectic of identity and sense-making. In other words, what Jonas is referring to, is the essential duality that, as Barbaras never tires of reminding us, imbues the French term *vivre*, the duality between "being alive (Ger. *Leben*)" – existence in the world – and "the feeling or experience of something (Ger. *Erleben*)" – *experience of the world* [24-26]. Again, it is only because of we have the capacity of the latter ("lived experience") that we are able to recognizing the former ("living beings"): "I cannot understand the function of the living body except by enacting it myself, and except in so far as I am a body which rises toward the world" [27; p.75]. The self-constituted (rudimentary) subjectivity of the autopoietic system would elude us if we did not have the first-hand experience of our own subjectivity:

We have seen how autopoiesis gives rise, in one stroke, to inwardness and outwardness, to the self-production of an inside that also specifies an outside to which it is normatively related. [...] [T]his inwardness or interiority is disclosable to us because we ourselves are living beings who experience our own bodily selfhood firsthand. [...] Thus, in the present context, the theory of autopoiesis provides a naturalistic interpretation of the teleological conception of life originating in experience, but our experience of our own bodily being is a condition of possibility for our comprehension of autopoietic selfhood [11; pp.163-164].

Ule is therefore right in claiming that experientiality is something fundamental, something irreducible, but he is wrong in postulating that it is an ontological primitive that needs to be made part and parcel of the material world. Experientiality is *not* an *additional ingredient* to the furniture of the world, but rather *the condition of possibility* for any kind of meaningful talk of the furniture of the world:

Experience is irreducible not because it possesses metaphysically peculiar “properties” that can’t be squeezed into some reified, physicalist model of the universe, after the fashion of contemporary property dualism. It’s irreducible because of its ineliminable transcendental character: lived experience is always already presupposed by any statement, model, or theory, and the lived body is an *a priori* invariant of lived experience. Experience is *die Unhintergebarkeit* – the “Ungobehindable” [16; p.394].

Note that, as already hinted in the quotation above, “the transcendental” should not be understood in idealist terms (say, in the vein of Husserl’s Ideas), but is much more in line with the non-dualism implied in Merleau-Ponty’s distinction between “lived body” (Leib) – a pre-reflective awareness of the body that shapes our experiential landscape (body as a living being) – and “physical body” (Körper) – reflective awareness of the body (body as a material thing). This distinction cuts through the typical mind – body duality as it anchors experience in materiality and materiality in experience: the human being not only “has a body” (Körperhaben), it also “is a body” (Leibsein), its fundamental mode of being is shaped by modes of its corporeality.

Hence, taking experientiality seriously would not imply incorporating it into the fabric of the material world, but would be much closer to Varela’s call for an ongoing back – and – forth exchange between lived experience and natural sciences [17]. This proposal has already borne much fruit in the field of cognitive science with the so-called 4 EA approach to cognition [28; p.10]. Unlike the classical models that conceive of mind in terms of a computer, i.e. a symbol-manipulating machine whose role is to internally portray external reality, the 4 EA models conceive of mind as *extended*, i.e., “cognitive states and processes can extend beyond the boundaries of the cognizing organism,” *embedded*, i.e., dependent on “facts about our relationship to the surrounding environment,” *embodied*, i.e., dependent on “facts about our embodiment,” *enactive*, i.e., “dependent on aspects of the activity of the cognizing organism,” and *affective*, i.e., “dependent on the value of the object of cognition to the cognizer” [29; p.89]. This latter conception is much more in keeping with phenomenological accounts of the late Husserl, Heidegger, and Merleau-Ponty and explicitly eschews reductionisms of every stripe. What is now needed is a *radicalization* of this fundamental tendency, a systematic interweaving of the two strands at all levels of living nature. This would mean that the process of the *naturalisation of life and mind* needs to be reciprocated by a process of the *phenomenologization of nature*, a process that would “recast the very idea of nature and modify accordingly our modern conceptions of objectivity, subjectivity, and knowledge” [30; p.54]. In other words, what is needed is not a *broader* naturalism⁶, i.e. naturalism that merely extends the reach of the material world by adding to it the property of experientiality, but rather naturalism *transformed*, i.e., naturalism founded on a *radical reconceptualization* of the concept of nature, “one that has room for such issues as meaning, context, perspective, affordances and cultural sediments” [31; p.15].

Interestingly enough, this brings us full-circle back to our previous topic, namely to Jonas’ and Varela’s conceptions of the living being as a self-constituting, self-organizing entity “thrown” into its world. Although still in their infancy, their suggestions can be said to have laid the foundation for a novel reappraisal of questions such as teleology, downward causation, etc., and might thus be understood as a first step in the process of reconceptualising nature and naturalism. This is not to say that they are, in themselves, sufficient but merely that they are, by taking the domain of lived experience seriously, paving the way from an epistemologically naïve (realist) conception of nature to a *phenomenologically-informed* view that might serve as a starting point for a Valerianesque back – and – forth exchange between science and lived experience alluded to above. Of course, it is an open question, whether any conceptual approach can, in principle, provide a

complete answer to questions of life and consciousness – I have argued elsewhere [4] that it cannot and that it needs to be reciprocated with an equally, if not even more radical, transformation at the level of our being –, but by acknowledging the blind spots in current naturalist approaches (perspectivity, experientiality) and offering constructive ways for overcoming them without ceding to eliminativist and reductionist tendencies, it might at least be argued that they are headed in the right direction.

REMARKS

¹In order to omit the unwanted dualist and/or spiritualist interpretations, and in line with the predominant terminology in the field, I will refrain from using the term “spirit” in the article and will make use exclusively of the term “mind”.

²The term “dialectic” is to be understood here in the sense given it by Levins and Lewontin in their book *The Dialectical Biologist*: “These are the properties of things we call dialectical: that one thing cannot exist without the other, that one acquires its properties from relation to the other, that the properties of both evolve as a consequence of their interpenetration” [32; p.3].

³A more precise definition is provided by Varela: “An autopoietic system is organized (defined as a unity) as a network of processes of production (synthesis and deconstruction) of components such that these components: (i) continuously regenerate and realize the network that produces them, and (ii) constitute the system as a distinguishable unity in the domain in which they exist” [7; p.81].

⁴Here, an important difference in terminology between Varela on the one hand and Thompson on the other should be mentioned: the former uses the terms “environment” and “world” to denote the “environment-for-the-observer” and the “environment-for-the-organism”, respectively, while the latter use the two terms in the exact opposite sense, i.e. as referring to “environment-for-the-organism” and the “environment-for-the-observer”, respectively. One of the main reasons for this “semantic inversion” was Thompson’s intention to better align the English with the German terminology of (particularly) phenomenological tradition (the more accurate translation of *Umwelt*, an environment-for-the-organism, would be “environment” or “niche”, and not “world”, as proposed by Varela). The article, as the reader has undoubtedly noticed, follows the Varelian version, thus trying to stay closer to the original literature on autopoiesis.

⁵It could be argued, of course, that similar ideas underlie Jonas’ exposition of needful freedom. It is obvious that the relationship between a self-constituting entity and its environment cannot be neutral: a living being whose main characteristic is “concern for itself” will find certain features of the environment more important than others and will thus necessarily delineate its domain of significance (its “world” or “milieu” emerging against the background of the [neutral] environment). However, Jonas never, at least to my knowledge, explicated these claims, i.e. he failed to provide a satisfactory account as to how, and why, metabolism-based identity might bring forth the “surplus of meaning”, nor did he consistently distinguish between the environment-for-the-observer and the-environment-for-the-organism.

⁶As correctly pointed out by Zahavi: “It is not as if matters would improve if naturalism opted for some version of emergentism or property dualism. The real problem has to do with naturalism’s commitment to scientism and metaphysical realism” [31; p.7].

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