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ORIGINAL RESEARCH

Life, sense-making, and subjectivity. Why the enactive conception of life and mind requires phenomenology

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Abstract

One of the ideas that characterises the enactive approach to cognition is that life and mind are deeply continuous, which means that both phenomena share the same basic set of organisational and phenomenological properties. The appeal to phenomenology to address life and basic cognition is controversial. It has been argued that, because of its reliance on phenomenological categories, enactivism may implicitly subscribe to a form of anthropomorphism incompatible with the modern scientific framework. These worries are a result of a lack of clarity concerning the role that phenomenology can play in relation to biology and our understanding of non-human organisms. In this paper, I examine whether phenomenology can be validly incorporated into the enactive conception of mind and life. I argue that enactivists must rely on phenomenology when addressing life and mind so that they can properly conceptualise minimal living systems as cognitive, as well as argue for an enactive conception of biology in line with their call for a non-objectivist science. To sustain these claims, I suggest that enactivism must be further phenomenologised by not only drawing from Hans Jonas's phenomenology of the organism (as enactivists often do) but also from Edmund Husserl's thoughts on the connection between transcendental phenomenology and biology. Additionally, phenomenology must be considered capable of providing explanatory accounts of phenomena

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1 Introduction

Within the current landscape of cognitive science and the philosophy thereof, one framework stands out as a plausible way of linking empirical and phenomenological research: the enactive approach. This approach is characterised by a circulation between *human* experience and the sciences of the mind, i.e., between phenomenology and cognitive science (Varela et al., 1991/2016). Enactivists are also concerned with other issues beyond human consciousness and cognition. In line with its roots in autopoietic theory, enactivism endorses the idea that life and mind are continuous. Enactivists claim that the continuity between life and mind is "deep", implying that "where there is life there is mind" (Thompson, 2007, p. ix). The deep continuity between life and mind has two aspects.

The first one states that the set of organisational properties that are fundamental to life are also fundamental to mind. Basic life would then imply a basic form of cognition.

Since phenomenology is often defined as the study of experience (e.g., Sokolowski, 2000) or the structures of consciousness (e.g., Smith, 2018), and insofar as it is unclear whether we can ascribe consciousness to all kinds of living systems, it could be assumed that the link between enactivism and phenomenology would only be found within enactive approaches to *human* consciousness and cognition. The second aspect of the deep continuity between life and mind is nevertheless a phenomenological one. As Thompson puts it, "certain existential structures of human life or phenomenological structures of human experience […] are applicable to life itself" (2011b, p. 216; see also 2007, pp. 129, 157). Thus, identifying those structures through phenomenological research may prove to be useful to the study of not only human consciousness and cognition but also of life itself.

The appeal to phenomenology to address life and basic cognition is controversial. Some philosophers have recently questioned it, arguing that the enactive conception of life and mind relies on phenomenological categories that may introduce an inadmissible form anthropomorphism (see, e.g., De Jesus, 2016; Villalobos & Ward, 2016). These worries are a result of a lack of clarity concerning the role that phenomenology can play in relation to biology and our understanding of non-human organisms that we would usually not ascribe consciousness to. In a nutshell, if enactivists can establish the continuity between life and mind in only organisational terms, it is unclear why they should also appeal to phenomenological categories to do so.

The purpose of this paper is to fill a gap in the current enactive literature, examining whether phenomenology can be validly incorporated into the enactive conception of mind and life. I argue that enactivists must rely on phenomenology when addressing life and mind so that they can properly conceptualise minimal living systems as cognitive, as well as argue for an enactive conception of biology in line with their call for a non-objectivist science (see, e.g., Thompson, 2016). To sustain these claims, however, I suggest that enactivism must be further phenomenologised by not only drawing from Jonas's phenomenology of the organism (as enactivists often do) but also from Husserl's (sparse) thoughts on the connection between transcendental phenomenology and biology. Additionally, phenomenology must be considered capable of providing explanatory accounts of phenomena.

First, in Sect. 2, I provide a detailed explanation of the enactive conception of life and mind. I introduce the enactive concept of sense-making, differentiation between two distinct characterisations thereof: operational and phenomenological. Thus far, these two characterisations have not been disentangled in the enactive literature. In Sect. 3, I examine the use of phenomenology in understanding life and sense-making. I argue that the charge of anthropomorphism is symptomatic of a lack of clarity regarding the role of phenomenology in the enactive conception of life and mind. In Sect. 4, I challenge the prevailing notion that phenomenology is purely descriptive by arguing that it can offer a *sui generis* form of explanation that is motivational rather than causal. I also explore Husserl's views on the relationship between transcendental phenomenology and biology. Lastly, in Sect. 5, I argue that transcendental phenomenology must be seen as a vital component of the enactive conception of life and mind. I propose that it allows for a non-objectivist approach to biology by emphasising the empathic constitution (i.e., disclosure) of organisms. Additionally, I argue that phenomenology is what allows enactivists to conceptualise sense-making as cognition. Thus, the operational characterisation of sense-making is, although important, insufficient. Consequently, organisms must be considered subjects in the broadest of senses.

2 Life and mind within the enactive approach

At the heart of the enactive approach, there is the idea that life and mind are deeply continuous (Thompson, 2007). In this context, the concept of continuity has its roots in the works of John Dewey (1938/2008, p. 30; see Di Paolo et al., 2017, p. 251). According to Dewey, X is continuous with Y if there are no gaps between them, meaning that X emerges from Y without being identical or reducible to it. Thus, if mind is continuous with life, then cognition must be viewed as a fundamentally biological phenomenon that nevertheless is not reducible to a mere set of biological mechanisms. Some proponents of this idea argue for a *strong* continuity (e.g., Wheeler, 1997), suggesting that the functional properties of the mind are enriched versions of the fundamental functional properties of life (Godfrey-Smith, 1996, pp. 320). Enactivists advocate for a *deep* continuity, which asserts that the organisational properties of life alone are sufficient for mind (Thompson, 2011b), and that life and mind share a set of phenomenological properties. Let me unpack these two points.

2.1 The operational way to sense-making

The first claim that constitutes the idea that life and mind are deeply continuous consists in taking cognition to be necessary for life, and therefore, life is sufficient for cognition. What allows enactivists to claim that is their definition of life as "*sense-making in precarious conditions*" (Thompson, 2011a, p. 114). Let me unpack this definition.

Rooted in the theory of autopoiesis (Maturana & Varela, 1980), enactivism conceives of living systems as autonomous (Thompson, 2007). In a nutshell, the theory of autopoiesis states that living systems are self-producing and self-distinguishing.

By being constituted by a set of recursive metabolic processes, an autopoietic system endogenously individuates itself by producing a boundary (e.g., the cell boundary), distinguishing itself from its environment. Autopoiesis can be generalised by appealing to the concept of autonomy (Varela, 1979). An autonomous system is characterised by being *operationally closed*, which means that it is constituted and individuated by a set of recursive processes at the organisation level (which is distinguished from the structural level, i.e., the actual current realisation of those processes). Importantly, an operationally closed system is neither thermodynamically nor materially closed. Put this way, autopoiesis is autonomy in the molecular domain. Whether there could be autonomy without autopoiesis is an empirical issue that remains unsolved (for discussion, see Thompson, 2011b, pp. 197–199, 215–216).

Autopoiesis alone, however, is not sufficient for life (Di Paolo, 2005; see also Bitbol & Luisi, 2004; Bourgine & Stewart, 2004). What is missing in autopoietic theory is an explicit thematization of adaptivity (i.e., "a system's capacity […] to regulate its states and its relation to the environment" (Di Paolo, 2018, p. 87) to recede from bounds of viability). Adaptive behaviour is crucial for life because organisms, while being robust (i.e., they can resist a degree of perturbations without disintegrating), exist in precarious conditions—metabolic processes cannot be sustained in the absence of a network of enabling recursive processes in which they are embedded and an enabling material environment with which the organism can exchange both matter and energy adaptively. Thus, enactivists conceive of living systems not only as autopoietic (and more generally, as autonomous) but also as adaptive.

Because living systems are adaptive, they must also be regarded as agents (Barandiaran et al., 2009). Not only, given their autonomous organisation, living systems define their own identity over and against their environment. They also behave in a way that, on the one hand, constitutes an interactional asymmetry between them and the environment, and on the other hand, is subject to norms. These two features (i.e., interactional asymmetry and normativity) serve as conditions for agency.

There is an interactional asymmetry between an organism and its environment because, in addition to the symmetric causal interactions that arise from the structural coupling between them (i.e., the ongoing dynamic coupling between the actual realisation of the organism's organisation and the environment), the organism can modulate its own interactions with the environment via its adaptive mechanisms. Such a modulation does not occur from the side of the environment. Therefore, the interactions between organism and environment are asymmetrical, allowing enactivists to conceptualise them as *behaviour* (Di Paolo, 2009).

The way living systems regulate their interactions with their environment is not random. The *goal* of such behaviour is to remain within bounds of viability. It is only when the behaviour of a living system is consistently directed toward its self-maintenance and continuation that we can regard it as adaptive and agentive. Consider bacterial chemotaxis. When the bacterium swims up a gradient of glucose (Varela, 1997), it does so because glucose provides the nutrients that it requires for its self-maintenance and continuation. Similarly, when the bacterium swims away from a concentration of phenol in its environment, it does so because phenol is a poison that would contribute towards its disintegration. Thus, one may describe the agential and

adaptive behaviour of living systems as normative given that it follows the norms of self-maintenance.

The norms that govern adaptive behaviour are not an all-or-nothing (Di Paolo, 2005). It is not simply that the organism must remain viable, as if there were no differences between the set of environmental interactions that it may engage with without dying. The point is that some interactions are better than others, even if the 'negative' ones do not lead immediately to death. To remain viable over time, the organism must be able to distinguish between degrees of 'good' or 'bad'. Thus, to conceive of an organism as an adaptive autonomous system (in contrast to it being merely autopoietic) is to recognise its capability of regulating its interactions in accordance with such graded biological norms.

The kind of viable, agentive conduct that arises from the adaptive autonomy of the organism is what enactivists call *sense-making* (Thompson, 2022, p. 237; see also Thompson & Stapleton, 2009, p. 25). Sense-making is cognition in the broadest sense (Thompson, 2007, p. 159). In this context, one can define sense-making as the differential operation that arises from the autonomous organisation and adaptive mechanisms of a living system (Di Paolo et al., 2018, p. 33). For instance, when behaving adaptively, the bacterium differentiates between glucose and phenol as interactions that would respectively contribute towards or disturb its self-maintenance. The behaviour that arises from adaptive autonomy is intentional in the sense that it is normatively directed toward the environment, allowing enactivists to describe sense-making as the basic form of intentionality, and thus, the mark of the cognitive (Weber & Varela, 2002; Thompson, 2007).[1]

From what I have presented so far, it is now clear that, in the enactive approach, life and mind (i.e., sense-making) are continuous. Both share the same set of organisational and even behavioural properties. When talking about life and/or mind, we must talk about autonomous organisation, adaptivity and agency. These categories allow us to understand sense-making and its relation to life. There is more to the deep continuity of life and mind, however. The path to sense-making drawn in this sub-section has only focused on the organisational properties of life and mind (and thus, it can be labelled an *operational characterisation of sense-making*). Thompson nevertheless claims that, aside from organisational (and behavioural) properties, life and mind also share phenomenological properties. It is this latter claim that properly allows an enactivist to go from a strong to a deep continuity between life and mind. Let me now turn to the phenomenological dimension of this continuity.

2.2 The phenomenological way to sense-making

Let me repeat the example of a bacterium swimming up a gradient of glucose, but this time quoting Varela's exact words at length:

[1] It is worth mentioning that here I focus on minimally agential biological systems like bacteria. The cognitive behaviour of such systems is guided by the metabolic norm of self-preservation. As biological systems become more complex, new kinds of norms and agency arise (e.g., sensorimotor norms and sensorimotor agency). Thus, the more complex the living system, the more complex its agency and cognitive capabilities are. For discussion, see Di Paolo et al. (2017, pp. 169–177).

> a bacteria swimming in a sucrose gradient is conveniently analyzed in terms of the local effects of sucrose on membrane permeability, medium viscosity, hydromechanics of flagellar beat, and so on. However, on the other hand the sucrose gradient and flagellar beat are interesting to analyze only because the entire bacteria [sic] points to such items as relevant: *their specific significance as components of feeding behavior is only possible by the presence and perspective of the bacteria as a totality*. Remove the bacteria as a unit, and all correlations between gradients and hydrodynamic properties become environmental chemical laws, evident to us as observers but devoid of any special significance. (1997, p. 79, emphasis added)

I want to focus on the claim that the significance of the glucose depends on the perspective of the organism. Such a claim is not only found in Varela's work; it is also made by later enactivists (e.g., Thompson, 2007, p. 154; Colombetti, 2014, p. 2; Di Paolo et al., 2017, p. 124). Since the work of Weber and Varela (2002), the characterisation of sense-making as involving an organismic perspective has been linked to Jonas's (2001) phenomenological approach to the organism.

One of Jonas's (2001) points is that a purely disembodied perspective—that of a god mathematician—would not be able to fully understand the meaning of metabolism. From a disembodied perspective, metabolism would be nothing but a set of causal processes in which materials chemically react with one another, maintaining the biological structure of a living organism. According to Jonas, what such a disembodied perspective would fail to notice is that, because of its metabolism, the organism is intrinsically teleological.

Jonas's argument is as follows. Life, as realised in metabolism, goes beyond being a mere collection of mechanical processes. Metabolism is considered both the defining characteristic of living organisms—referred to by Jonas (2016) as "the fundamental mode of organic existence"—and what distinguishes life from the mechanistic order of physical nature. The idea is that metabolic processes constitute an identity that distinguishes itself from its milieu. Metabolism thus entails organic identity. There is no need for an external observer to identify the organism as a unified entity for it to be considered a "self"; organic identity is self-constituting. Jonas characterises the identity constituted through metabolism as a formal identity. Metabolic processes are realised in a flux of matter, meaning that at each instant the material identity of the organism changes incessantly. Hence, the identity of the organism must be understood at a formal level that, being irreducible to matter, is in a sense 'free' from materiality. However, because metabolism is precisely the organic exchange of matter with the environment, the organisms 'needs' matter. Without metabolic exchanges, the organism dies. Thus, Jonas claims, "organic form stands in a dialectical relation of *needful freedom* to matter" (2001, p. 80).

Jonas characterises the needfully free nature of organic form as *concern*: "[I]n order to change matter, the living form must have matter at its disposal […]. [I]ts want goes out to where its means of satisfaction lie: its self-concern, active in the acquisition of new matter, is essential openness for the encounter of outer being" (2001, p. 84). Such a concern throws the organism outside of itself in a form of self-transcendence that links the organism to its surrounding material world. Self-

transcendence is correlated with an inwardness that, for Jonas, corresponds to the locus of the concerned selfhood of the organism. Insofar as life is defined by phenomenological categories like need, concern, self-transcendence, and inwardness, it can be understood as intrinsically teleological.

The phenomenological move that Jonas performs is intertwined with the fact that, for him, we can recognise the intrinsic teleology of life because we are alive. As he famously puts it, "life can only be known by life" (2001, p. 91). The difference between us and the disembodied god mathematician is that, unlike it, we are living bodies that are defined by a metabolic mode of existence, and therefore "we happen to have inside knowledge" (Jonas, 2001, p. 79).

According to Thompson, Jonas provides a "philosophical account that can bridge the gap between autopoietic biology and phenomenology" (2007, p. 149). Key points of Jonas's analysis of metabolism align with the theories of autopoiesis and adaptive autonomy. First, autopoiesis involves self-production and self-distinction, implying that the system generates its own identity, akin to Jonas's view of a self-constituting organic identity. Second, the distinction between structure and organisation in autopoiesis corresponds to Jonas's distinction between matter and organic form. And third, autopoietic self-organisation exists under precarious conditions, requiring supportive materials to sustain itself. Thus, following Jonas's step from needful freedom to concern, Weber and Varela (2002, p. 117) claim that autopoiesis implies a "concern to affirm life", establishing a teleological aspect within autopoiesis, thus sharing with Jonas's teleological conception of life.[2] Within the enactive framework, this teleology is naturalised since autopoiesis is a non-mysterious process of self-organisation. Crucially, enactivists agree with Jonas that we recognise the intrinsic teleology of autopoietic systems because we are living systems (Weber & Varela, 2002, p. 110; Thompson, 2007, pp. 162–165).

This teleology intrinsic to organisms is sense-making. Given its self-concerned existence, the organism must interact adaptively with its material environment to keep its self-producing processes running. Given the organism's adaptive nature and its need for keeping itself alive, the surrounding environment acquires significance and value *from the perspective of the organism*. The significance of glucose as positive and phenom as negative only arises from the point of view of the bacterium. The point is that, just as concern implies self-transcendence in the Jonasian analysis, the precarious existence of an autopoietic system implies sense-making in the enactive framework. Sense-making, however, must also involve a concerned perspective (inwardness, in Jonas's terms) from which the world acquires significance, propelling it to interact adaptively with the now meaningful environment. Thus, Thompson (2007, 2011b, 2022) also tends to characterise sense-making as a 'bringing forth' of meaning.

I call the characterisation of sense-making undertaken in this sub-section a *phenomenological characterisation*. In contrast to the operational characterisation, the

[2] Strictly speaking, there are two kinds of teleology at play here (Di Paolo, 2005). The first one is defined by the fact that, within autopoietic self-organisation, constitutive processes naturally tend toward the self-production of the autopoietic whole. In other words, the organism is its own (self-producing) end. The second one is sense-making.

phenomenological one stresses the existential nature of sense-making, emphasising the concerned perspective of the organism from which meaning is brought forth. Notice that these two characterisations are not inconsistent with one another. They are simply two complementary perspectives on a single phenomenon. Sense-making involves both organisational and phenomenological properties. It is, however, important not to conflate them because each kind of property calls for a different way of approaching it (e.g., an empirically grounded examination of the adaptive mechanisms that are at play in the agential behaviour exhibited by organisms vs. a phenomenological analysis of the existential structures that are characteristic of life and mind).

In sum, within the enactive approach, life and mind are conceived of as deeply continuous. This continuity, in contrast to the strong one—which only focuses on the organisational properties of life and mind—, is defined by both organisational *and* phenomenological aspects.[3] The former implies that the organisational properties that are fundamental to life are sufficient for mind. The latter implies that both life and mind share a set of phenomenological properties. These two aspects are revealed by elaborating on the classic autopoietic theory, disclosing life as sense-making in precarious conditions, as well as borrowing from Jonas's analysis of metabolism.

3 Is there a need for phenomenology when addressing life?

Recent critical literature on the enactive conception of life and mind has questioned the appeal to Jonas, and therefore, what I have called the phenomenological characterisation of sense-making. Most of these criticisms claim that the use of phenomenological categories to understand life and basic cognition entails the subscription to a form of anthropomorphism (see, e.g., De Jesus, 2016; Villalobos & Ward, 2016; Sachs, 2023).

Roughly, the charge of anthropomorphism states that the attribution of phenomenological categories to all kinds of living organisms relies on an analogical inference with which we project our own inner experience of intrinsic teleology onto the observed exteriority of the living bodies of non-human organisms, concluding that all living organisms have a mental life that is somewhat like ours. Such anthropomorphic inference is inadmissible on the grounds that, on the one hand, it is at odds with a scientific context like the one enactivists are a part of (Villalobos & Ward, 2016), and on the other hand, it fails to account for how the mental lives of non-human organisms may be different from the kind of one that humans enjoy (De Jesus, 2016). The result is, thus, a dilemma for the enactivists: either they drop their reliance on phenomenology when addressing minimal life and cognition, abandoning the phenomenological aspect of the deep continuity between life and mind; or they subscribe to an anthropomorphic conception of life and mind.

[3] Thompson (2007) does not distinguish between a strong and a deep continuity between life and mind. I believe, however, that we ought to distinguish them because it is possible to claim that life and mind share a basic set of organisational properties (strong continuity) without necessarily subscribing to the idea that they share phenomenological properties as well (see, e.g., Wheeler, 1997; Kirchhoff, 2018).

In this paper, I do not plan to address the charge of anthropomorphism head-on.[4] I believe, however, that this criticism is symptomatic of a deeper issue within the enactive approach, namely, the lack of clarity concerning the need for phenomenology when addressing mind *and* life. This point is nicely put by Villalobos and Ward:

> The introduction of phenomenology […] is perhaps the most valuable contribution of [enactivism] to cognitive science. Why put it at risk by loading it with anthropomorphic elements? Why not recover a more standard version of phenomenology, focused on and restricted to the examination of *human* experience, in keeping with the original spirit of [enactivism]? […] What is gained by, under the banner of a questionable anthropomorphism, trying in addition to teach us lessons about *bacterial* experience? (2016, p. 208)

This issue becomes even clearer when examining some of Thompson's claims on phenomenology and consciousness. For him, phenomenology is "a philosophy of the lived body" (2007, p. 16). This claim must be understood in connection to the phenomenological distinction between the lived body (*Leib*) and the objective body (*Körper*).[5] The former refers to the (often pre-reflective) experience of one's own embodiment as that through which one experiences the world or as the subject of experience, whereas the latter refers to the body understood as a physical object in the world. The lived body and the objective body are not two distinct entities, but rather two complementary perspectives on the same phenomenon. Relying on the double phenomenological sense of embodiment, enactivists often argue for a circulation between phenomenology and empirical science (see Varela et al., 1991/2016; Varela, 1996; Thompson, 2007). It is unclear, however, whether all kinds of organisms experience their own body, either as a subject (i.e., as a lived body) or as an object (i.e., as an objective body). In fact, Thompson (2007, pp. 161–162) argues that sense-making does not imply consciousness in the sense of sentience. He defines sentience as "a kind of primitively self-aware liveliness or animation of the body" (2007, p. 161), as well as "being able to feel the presence of one's body and the world" (2007, p. 221). Even though he does not put it in this way, it seems plausible to say that to be conscious in the relevant sense (i.e., sentience) involves having experiential access to one's body and its relation to the world, implying that one has a lived body. Minimal autopoiesis, Thompson claims (2007, p. 162), does not suggest intentional access from the perspective of the organism to its embodied sense-making capabilities. For him, such a kind of awareness requires a nervous system. Rather, he concludes, it is better to link sense-making and autopoiesis to unconscious processes of life regulation.[6] From this perspective, life may be sufficient for sense-making, but not for consciousness (see also Di Paolo et al., 2017, Chap. 9).

[4] For recent replies to the anthropomorphism charge based on nuanced readings of Jonas's work, see Hverven and Netland (2023), and Prokop (2022).

[5] Classical sources of this distinction are Husserl (1989) and Merleau-Ponty (1945/2012).

[6] More recently, Thompson (2022) has claimed that he is no longer convinced by the arguments he used in *Mind in Life* to reject the claim that sense-making implies sentience. In this recent work, he seems to lean more into the possibility of all life being sentient (which would be in line with the main claims of this paper). He still nevertheless concludes that there are no conclusive reasons to think so.

If phenomenology is the study of consciousness and experience, or a philosophy of the lived body as Thompson puts it, then it would appear that the phenomenological characterisation of sense-making would rely on a category mistake by ascribing phenomenological categories to organisms that lack consciousness and a lived body. It is partly based on this category mistake that the charge of anthropomorphism is formulated.

As discussed by Barrett (2017), what is aimed to be achieved with the appropriation of Jonas's phenomenology by enactivists is an explicit thematization of the normative character of cognition without appealing to representational content. Given that an autopoietic system is conceived as a self-concerned organism, the significance of its world is defined from within and not by an external observer. The cognitive behaviour of an organism must be understood as normative because, while acting adaptively within its environment, the organism follows what Weber and Varela call 'the mother-value of all values', namely, "the 'Yes!' to our continued existence" (2002, p. 111). In other words, because the organism is defined by concern, the way it behaves follows the norm of self-affirmation. This self-affirmation is achieved because of the intrinsic teleology of the organism. As discussed in Sect. 2, this teleology implies a perspective over the world:

> Contact with the world is thus always value […]. The perspective of a challenged and self-affirming organism lays a new grid over the world: a ubiquitous scale of value. To have a world for an organism thus first and foremost means to have value which it brings forth by the very process of its identity. (Weber & Varela, 2002, p. 118)

Therefore, phenomenological categories like concern pave the way towards a normative conception of cognition all the way down to simple organisms.

The use of phenomenological categories only seems warranted in the case of basic living systems if we can attribute them consciousness or something akin to it that can be subject to phenomenological analysis. The talk of a 'concerned perspective' in the enactive literature (Weber & Varela, 2002, p. 110; Thompson, 2011b, p. 199) suggests that such a perspective is meant to carry the weight that 'consciousness' carries in phenomenological literature. In fact, Weber and Varela (2002, p. 119) equate the concerned perspective of the organism with *subjectivity*, which is a notion that plays a crucial role in Husserlian phenomenology.

The link between subjectivity and the concerned perspective that arises with sense-making has nevertheless been either severed or omitted since the publication of Weber and Varela's paper. For instance, Thompson (2011b, p. 209) clarifies that the kind of inwardness that is implied by the organismic perspective in sense-making "is a precursor to subjectivity". He then adds that a "full account of consciousness and its relation to biological life would require an explanatory bridge from the one kind of inwardness to the other [i.e., from the organismic perspective in sense-making to consciousness]". Some (but certainly not all) of the more recent enactive literature, while mainly focusing on the operational characterisation of sense-making, avoids any reference to subjectivity whatsoever when discussing sense-making or the perspective of the organism (see, e.g., Mojica & Froese, 2021; Kiverstein et al., 2022). And, even

when acknowledging the importance of subjectivity for an enactive conception of life and mind, Di Paolo (2018) mostly focuses on the categories of autonomy and agency (which are related to the operational characterisation of sense-making, as discussed in Sect. 2), omitting possibility of phenomenologically analysing sense-making. Arguably, it is possible to get normativity and adaptive behaviour by considering the precarious and robust existence of living systems. Doing so, allows enactivists to go from adaptive autonomy to agency and sense-making (in its operational characterisation) without needing to invoke phenomenological categories. If the operative characterisation of sense-making is sufficient for intentionality, then arguably it would not be necessary to introduce its phenomenological characterisation.

As noted by an anonymous reviewer, my conceptualisation of the kind of sense-making that results from the omission of its phenomenological dimension leads to something that is not too different to how so-called 'radical enactive cognition' (REC) theorists like Hutto and Myin (2017) conceive of basic cognition (i.e., as a minimal form of selective responsiveness to the environment that is characterised by a naturalised teleology and that lacks any content). As noted by the reviewer, enactive theorists committed to the deep continuity of life and mind would not see sense-making as co-extensive with REC-style basic cognition. I agree with the reviewer on that point. However, I believe that that fact shows that there is more to the enactive conception of life and mind than the presence of adaptive mechanisms in organisms that give rise to a form of agential behaviour. Arguably, such a kind of behaviour can be made sense of through the lens of REC by referring to how, because of natural selection, organismic responses target certain environmental features selectively. In fact, Hutto and Myin speak approvingly of the enactive conception of "basic goal-directed cognition of agents in terms of biological norms without invoking […] mental contents, prior intentions, directions of fit, and the like" (2017, p. 77). But, as they claim later, the enactive approach "goes beyond REC in holding that basic minds are capable of 'sense making'" (2017, p. 79).[7] From this perspective, then, sense-making requires more than mere adaptive, agential behaviour. What is missing is an explicit commitment to its phenomenological aspects. Doing so, however, is makes enactivists a target of the charge of anthropomorphism. It seems, then, that enactivists must either align with REC theorists or embrace the phenomenological dimension of sense-making, making them vulnerable to the charge of anthropomorphism.

To deepen the issue at hand, one can also argue that, even if the perspective that arises with sense-making were open to a phenomenological analysis that would reveal it to be a concerned perspective, the enactive move nevertheless goes the other way around. For the enactivist, we can attribute a perspective to organisms because, given their autopoietic organisation, they have a concerned existence. More concretely: from the fact that organisms are adaptive autopoietic systems, it is deduced that they have a concerned existence, which in turn is used as a premise for concluding that they have a perspective over the world. Thus, the connection between phenomenology and autopoietic biology seems to rely on a leap between a specific kind of biological self-organisation (i.e., autopoiesis) and the attribution of a perspective

[7] For more on the distinction between REC-style basic cognition and enactive sense-making, see Thompson (2018) and Bogotá (forthcoming).

to all organisms. What justifies the attribution of such a perspective? It cannot be the existential category of concern, since, given its phenomenological nature, it already presupposes a perspective, and more specifically, a *subjective* perspective. What is it, then, that justifies enactivists to go from the biological self-organisation of the living to the claim that life implies a (concerned) perspective over the world?

It could be argued that Jonas's phenomenological analysis of metabolism and its similarities with the autopoietic view on life that enactivists draw from is what bridges the gap between biological self-organisation and concern. That is Weber and Varela's (2002) strategy. The issue is that Jonas, Weber, and Varela are happy to ascribe a form of subjectivity (and even awareness, see Jonas, 2001, p. 84) to all living beings. When later enactivists either sever or omit the link between minimal life and subjectivity, it becomes unclear how we can go from autopoiesis and adaptivity to phenomenological categories such as 'concerned perspective'. What justifies, then, the link between biology and phenomenology within the enactive framework?

4 Phenomenological explanations and biology

A clue concerning the link between biology and phenomenology within the enactive framework can be found in a somewhat revealing but also perplexing footnote in Thompson's *Mind in Life*. When discussing sense-making, Thompson (2007, pp. 453–454, n. 8) recalls an e-mail exchange he had with Varela in 1999 in which they discussed the latter's views on autopoiesis, teleology, and the relationship between phenomenology and biology. At the time, Varela was suspicious about ascribing intrinsic teleology to all autopoietic systems. This suspiciousness can be traced back to the original characterisation of autopoiesis as precluding any kind of teleology (Maturana & Varela, 1980, pp. 85–86). When pressed by Thompson on his views on teleology and "*the explanatory role* that phenomenology could play in relation to biology" (Thompson, 2007, p. 453, emphasis added) given Jonas's arguments, Varela replied that he preferred to link phenomenology and biology by avoiding teleology and focusing on original intentionality:[8] "Appealing to sense-making, [Varela] suggested, was more 'constructive' than appealing to the 'elusive principle of purpose.' Sense-making provides a strong link to intentionality, but 'whether this turns into teleology,' he said, 'is another matter'" (Thompson, 2007, pp. 453–454). Thompson recounts how unsatisfactory he found Varela's reply at the time, mentioning how he thought that both sense-making and original intentionality are teleological categories. "The issue", Thompson says, "is precisely how to analyze this teleology" (2007, p. 454). As the discussion presented in Sect. 2 shows, Varela changed his mind and eventually linked sense-making not only to original intentionality but also to teleology.

What is perplexing about this footnote is the fact that it presents the link between phenomenology and biology vis-á-vis sense-making, teleology, and intentionality as

[8] There is some ambiguity in Thompson's phrasing here. It is possible to read Varela's suspicions not only related to teleological explanations within biology, but also to a possible link between phenomenology and biology.

that of an *explanatory role*. This is striking for two reasons. First, as discussed in Sect. 3, it is unclear whether phenomenology can say anything about minimal life and cognition insofar as it is usually taken to be the study of the structures of consciousness and experience.[9] Even if minimal adaptive autopoietic systems are cognitive, as enactivists claim, it remains unclear whether they are conscious. Thompson even argues that there is no conclusive reason to claim so. Second, classical phenomenologists often claim that phenomenology is not an explanatory discipline, but rather a descriptive one (see, e.g., Husserl, 2002; Merleau-Ponty, 1945/2012, pp. lxxi-lxxiv). Thompson himself links phenomenology to description rather than to explanation: "Phenomenology is anchored to the careful description, analysis, and interpretation of lived experience" (2007, p. 16). How, then, could phenomenology hold an explanatory role in relation to biology? I now turn to address this question by first exploring how phenomenology could give explanations at all, and then linking the idea of phenomenological explanations with some of Husserl's sparse thoughts on biology. These two points allow me to draw a link between phenomenology and biology, as well as the enactive conception of life and mind.

4.1 Phenomenological explanations

There is extensive philosophical literature on explanation, particularly scientific explanation (for an overview, see Woodward & Ross, 2021). When discussing explanations, it is important to differentiate between the explanans and the explanandum. The explanans aims to account for the explanandum. Different philosophical accounts of explanation conceive of the link between the explanans and explanandum differently. Here, I do not advocate for any specific account. Rather, I emphasise three points that are relevant when considering the potential explanatory role of phenomenology vis-à-vis biology.

First, explanations, unlike descriptions, provide answers to *why-questions* (e.g., "Why does the explanandum occur?"). While descriptive accounts are valuable for acquiring knowledge, they do not answer such questions. Second, although scientific explanations are usually causal, there are non-causal forms of explanation. For example, Euler explained why nobody could cross each one of Königsberg's seven bridges exactly once by reformulating the problem mathematically, without mentioning any causal connections (Reutlinger, 2017). As such, explanations help us *understand* things. This leads to the third point: understanding and explanation are not always distinct (cf. von Wright, 1971). Some philosophers argue that explanations aim to produce understanding in cognitive agents (Hills, 2015; Elgin, 2017; Potochnik, 2017). To understand something is to hold it as intelligible. However, not all understanding is explanatory. *Describing* my room to someone who has never seen it

[9] As noted by an anonymous reviewer, Jonas is not the only exception of the phenomenologists' usual focus on consciousness. In his first work, Merleau-Ponty (1945/2012) analyses what he calls 'the living order', i.e., a level of organisation whose general Gestalt differs from the one found in non-living material structures. It is also possible to refer to Barbaras' (2008) phenomenology of life, according to which what ontologically characterises a subject is not consciousness but 'being-alive' (*vivre*). Examining whether and/or how the views of these phenomenologists may enrich the enactive conception of life and mind, although an interesting project, is beyond the scope of this paper.

may help them *understand* how it looks, but it is not an explanatory understanding. Explanatory understanding involves grasping regularities within a limited range of phenomena (Potochnik, 2017), allowing us to answer why-questions and formulate predictions.

Given the three points above, it is possible to argue that phenomenology can provide explanations.

A good example of a phenomenological explanation is Husserl's analysis of the experience of a string of lights that are perceived as a unity:

> While taking an evening stroll on the Loretto Heights a string of lights in the Rhine valley suddenly flashes in our horizon; it immediately becomes prominent affectively and unitarily without, incidentally, the allure having therefore to lead to an attentive turning toward. That in one stroke the string of lights is affective as a whole is obviously due to the pre-affective lawful regularities of the formation of unity; because of them possibly other groups of lights in the visual field will also simultaneously be there affectively as prominent special unities, and this *ceteris paribus*. (2001, p. 202).

Here, Husserl goes beyond the mere description of having seen a string of lights in his visual horizon. Specifically, after briefly describing the experience, he clarifies *why* it is constituted (i.e., meaningfully structured) the way it is. The string of lights is experienced as a unity *because* of the lawful regularities that structure how objects affect us. Husserl (2001) analyses those lawful regularities at length, but they are not relevant for my current purposes. What I want to stress is that this quote illustrates how, within phenomenology, one can go from a description of experience to an explanation of why that experience is structured in the way it is.

The analysis just mentioned is an example of what Husserl calls a genetic analysis. He distinguishes between static and genetic phenomenology (e.g., Husserl, 2001, pp. 624–634). In a nutshell, static analyses revolve around the *description* of the essential structures of consciousness, focusing on the correlation between intentional acts and intended objects. Within static phenomenology, experiential unities are taken as "finished" (Husserl, 2001, p. 345/634). In contrast, genetic analyses focus on the genesis and development of subjectivity. The idea is to trace the subjective constitution of meaning back to its emergence in "pure passivity" according to "essential laws" (Husserl, 2001, pp. 339–342/627–631). Instead of focusing on the *being* of the subjective correlation between consciousness and world (as the static method does), genetic phenomenology is meant to thematise its *becoming* (Welton, 2003). By doing so, genetic analyses *explain* why the 'finished' structures that are described statically appear in the way they do, namely, because of fundamental lawful processes of subjectivity that give rise to those structures.

Phenomenological explanations are not causal but motivational. They disclose relationships of *motivation* between subjective phenomena, going beyond the scope of natural relations like causality. Motivation refers to a subjective connection (as opposed to an objective causal connection) between two experiential phenomena, where one reacts to or triggers (usually passively) the other, without explicit causal links (Merleau-Ponty, 1945/2012, p. 51). Examples include when something uninten-

tionally reminds us of something else, when something in our visual field makes us turn towards it without an explicit reason to do so, or when we implicitly anticipate something to happen because of what just occurred.

Through genetic analyses, phenomenology aims at revealing the lawful (i.e., regular) structure of motivational links within experience. In this regard, the explanations formulated within phenomenology are not causal, but motivational. This fact distinguishes phenomenological explanations from the other ones, meaning that they are *sui generis*.

An interesting point worth mentioning is that, as Potochnik (2017) argues, the regularities grasped in explanatory understanding may have deviations and exceptions. In the context of regularities of motivation, such deviations and exceptions have a clear expression in pathological experience. A good example of this point is Merleau-Ponty's (1945/2012) analysis of Schneider's case. Using Schneider's pathological experience as a deviation from the rule, Merleau-Ponty discloses fundamental structures of subjectivity (e.g., the intentional arc, the body schema, etc.) which are affected in Schneider's experience.

In sum, given the step from a static and descriptive phenomenology to a genetic one that reveals the fundamentally lawful structures and operations of subjectivity, phenomenology becomes able to provide explanatory accounts. These explanations, instead of referring to causal regularities in the world, reveal lawful relations of motivation that may help us understand why experience is structured the way it is.[10]

4.2 Biology and transcendental phenomenology

From the outset, it may appear strange to claim that phenomenology plays an explanatory role vis-á-vis biology. Biological phenomena of interest (e.g., evolution, species, organisms, proteins) are natural phenomena that typically require explanations within the framework of the natural sciences. This framework predominantly relies on causal explanations, which ought to be distinguished from motivational explanations. If phenomenological explanations are indeed distinct, it follows that scientific explanations cannot be phenomenological, and vice versa. And yet, in a brief supplementary text to *Krisis*, Husserl suggests that biology has a privileged spot within the natural sciences because of its closeness to transcendental philosophy (see Husserl, 2013). This closeness need not be an explanatory one. I believe, however, that it paves the way towards a phenomenological explanation of biological science.

According to Husserl, life is originally experienced through our own humanity. Because we implicitly experience ourselves as human beings, we gain access to life as such. In other words, we implicitly experience ourselves as *living* humans. That implicit self-understanding is the basis for biological knowledge and science (Husserl, 2013, p. 6). The idea is that, as Meacham (2013) puts it, biology is an "empathic science". Our self-understanding as living humans allows for an understanding of other organisms as living organisms. The step from self-understanding to understand-

[10] For discussions concerning phenomenology and explanation, see papers in Williams and Musholt (2023).

ing of other living beings is achieved by "variant forms of empathy" (Husserl, 2013, p. 6).

'Empathy' (*Einfühlung*) is the term used by phenomenologists to refer to the kind of experience in which other subjects are disclosed as such. An in-depth elaboration of the phenomenology of empathy is beyond the scope of this paper (see Husserl, 1960, §§ 45–54; 1989, §§ 43–47; Stein, 1989). Suffice it to say that, for Husserl, empathy requires a degree of similarity between oneself and the other subject. This similarity is to be found in embodiment. Just as I am an embodied subject who experiences himself as both a lived and an objective body, I experience other persons as embodied subjects. Because of the similarities between their objective bodies and mine, their bodies are also disclosed as lived bodies, constituting them as subjects. This empathic constitution is not to be conflated with an analogical inference. Husserl explicitly states that empathy is achieved through a 'passive synthesis' (i.e., a subjective synthesis that occurs without the subject actively eliciting it). In other words, within my experience of another person, the fact that she appears as an objective body similar to mine motivates experiencing her as a lived body as well without me performing any inference whatsoever. This synthesis nevertheless requires a degree of bodily self-understanding. Specifically, my own body must have been constituted as both a lived and an objective body for me to experience the other as an embodied subject.

Biology can be considered an empathic science because, as Husserl suggests, when a biologist approaches another living being, something akin to the empathic constitution of other people is operating in the background. More specifically, the biologist recognises other living organisms without employing any inference or theorization. Instead, organisms are empathically disclosed as living beings as such in virtue of the biologist's implicit self-understanding of her own humanity. "Only from here", claims Husserl, "the concept of organism draws its ultimate sense" (2013, p. 6). All this means that biology as a scientific field is possible only because, before any theorising, living beings appear as such to the biologist.[11]

Importantly, for Husserl, biology is not only an empathic science. It is also, unlike mathematical physics, concrete. Let me explain in which sense it is a concrete discipline.

As Husserl argues (Husserl, 1970, §§ 8–12), the historical development of modern science has moved scientific research away from the original sources of evidence, i.e., the lifeworld (the world as it is originally and naïvely experienced prior to scientific theorisation thereof). The mathematisation of science, and with it, the mathematisation of nature has entailed the abstraction of subjectivity from scientific knowledge. It is, however, subjectivity where meaning is constituted and where the world is originally given. Thus, for Husserl, natural science is somewhat detached from the experiential world, leading to what he calls a crisis. Such crisis has to do with an abstraction from our concrete engagements with the lifeworld. The presence

[11] There is an undeniable similarity between Husserl's view and Jonas's claim that life can only be known by life. As I argue below (see Sect. 5.1), however, there is an important methodological difference between Husserl and Jonas: whereas Jonas's claim comes as the conclusion of his analysis of metabolism, Husserl's claim is his starting point.

of that crisis does not mean that the natural sciences are devoid of any reference to subjectivity. Instead, Husserl's point is that, because of their historical development, natural science (most notably, physics) has 'forgotten' the constitutive role that subjectivity and the lifeworld play in relation to their achievements. More generally, all science is a subjective achievement, and forgetting that leads to what Husserl calls a crisis. Regardless of this crisis, Husserl nevertheless suggests that biology differs to a certain extent from the rest of the natural sciences because, despite its investigations into ontogenesis and phylogenesis, it "hides an ontology in itself, […] an ontology which is not […] the ontology of nature; that is, of the mathematics of nature" (Husserl, 2013, p. 6). In other words, for Husserl, there is something about biology that maintains a distance between it and both physicalism and the mathematisation of nature found at the heart of natural science.[12] Because of this distance, biology involves concreteness (i.e., instead of solely relying on idealised mechanical explanations of its phenomena, biology remains rooted in the lifeworld).[13]

The empathic and concrete characteristics of biology converge in Husserl's views on the connection between biology and transcendental philosophy. Part of why biology, for Husserl, remains at a distance from other natural sciences lies in the fact that biology, regardless of mechanistic and mathematical approaches to biological problems, always involves an element of self-understanding—a self-understanding that is often implicit. According to Husserl, our understanding of biological phenomena is guided by our understanding of ourselves as human and living beings. In biological science, this tacit dimension of self-understanding is often subject to reflective analysis (making explicit what often is implicit). This self-reflective stance is a characteristic feature of transcendental philosophy (Husserl, 1989, § 75/Appendix IV), implying a proximity between transcendental phenomenology and biology. At this level, biological phenomena ought to be taken, not in relation to physicalist and mathematical theorisation, but as they are given in the lifeworld. Thus, Husserl claims, "[biology] has no explanatory task other than that demanded by the transcendental […] approach to the lifeworld and its constitution. It would hence attain the degree of explanation in the sense of an understanding based on ultimate sources of evidence" (2013, p. 7). Put this way, at this foundational level, biology would converge with transcendental phenomenology in the enquiry about the constitution of the lifeworld. Such a world can be considered as being co-constituted not only by other human beings but also by other living beings (Steinbock, 2003). Thus, an understanding of the constitutive achievements of life is required, bringing biological and transcendental knowledge together. As I now turn to show, this transcendental understanding of biology reveals,

[12] Husserl does not provide examples illustrating how biology remains distinct from physicalism and not overly reliant on mathematics. Jan Baedke (in conversation) has drawn my attention to the historical context in which Husserl wrote the addendum. During that time, proponents of organicism and holism in both German and British theoretical biology argued that while physical principles may impose constraints on biological phenomena (e.g., non-equilibrium thermodynamics), biology could not be reduced to physics. Needham (1936, p. 45), for instance, stated that biological order represents a form of order separate from those found in physics or chemistry, constituting a new dialectical level. For a comprehensive overview and discussion, see Nicholson and Gawne (2015), and Baedke (2019).

[13] Husserl does not deny that some problems within biological research are prone to physical and mathematical explanations. His point is that those problems presuppose a descriptive and concrete approach to biological phenomena as it appears immediately in the lifeworld.

on the one hand, the explanatory role of phenomenology vis-á-vis biology, and on the other, the need for the phenomenological conception of sense-making in the enactive framework.

5 Phenomenologising the enactive conception of life and mind

Bearing in mind Husserl's views on biology, as well as the possibility of phenomenological explanations, it is time to address the kind of role that phenomenology could have vis-á-vis the enactive conception of life and mind. The upshot of these considerations is a further phenomenologisation of enactivism.

In a nutshell, there are two aspects in which phenomenology may contribute to how enactivists thematise life and mind. I elaborate on these two aspects in this section. The first aspect consists in providing a phenomenological grounding to biology, considering the embodied situatedness of the biologist and her enactment of biological knowledge (Sect. 5.1). The second one consists in revealing and further expanding the need for the phenomenological characterisation of sense-making, explicitly linking it with subjectivity and the phenomenological concept of transcendental constitution (Sect. 5.2). These two aspects rely on the genetic method that allows for phenomenology to provide explanations, implying that phenomenology stands in an explanatory relation with biology.

It is worth mentioning that these points are not foreign to the enactive approach. They are present, to a certain extent, in some of Varela's and Thompson's works. More recent enactive literature, however, has seemingly moved away from phenomenology while endorsing more explicitly the naturalist framework of the empirical sciences, as well as relying upon other philosophical approaches such as pragmatism (see, e.g., Gallagher, 2017; for an exception, see Netland, 2024) or Gilbert Simondon's ontology of individuation (see, e.g., Di Paolo et al., 2018). [14] As I see it, the downplaying of the phenomenological aspect of sense-making in recent literature is symptomatic of some distancing between enactivism and phenomenology. This distancing, however, is problematic since, as I now turn to argue, it is through phenomenology that core enactive ideas concerning life and mind acquire their meaning.

5.1 Toward an enactive conception of biological science

The first aspect in which genetic phenomenology is relevant for the enactive conception of life and mind must be understood in the context of the enactive conception of science. Consider Varela's reformulation of 'hard' in the hard problem of consciousness (i.e., the question of why it is that something like phenomenal consciousness arises from mechanical processes in the brain): "[I]t is hard to change the habits of science in order for it to accept that new tools are needed for the transformation of

[14] I do not want to suggest that enactivism must be exclusively wedded to phenomenology. I full-heartedly endorse a pluralist approach to cognition. What I want to stress in this section, however, is the importance that phenomenology should still have within the enactive approach, specifically when it comes to the deep continuity between life and mind.

what it means to conduct research on mind and for the training of succeeding generations" (1996, p. 347). A guiding idea that is found since the first formulation of the enactive approach is that science must involve lived experience in its practice (Varela et al., 1991/2016). The usual way of interpreting this claim is by stating that the scientific study of human consciousness and cognition must take into consideration phenomenological analyses and descriptions of lived experience. This interpretation is partly true, but it fails to see the radicality of the enactive claim. It is not simply that phenomenological data must be taken as a component of scientific research, but also that science must recognise itself as an experiential achievement. Given that enactivism is an embodied and situated approach to cognition, its ideas must feedback into scientific practice because the scientist is an embodied and situated agent engaged in a rather complex form of cognitive behaviour, i.e., scientific practice. Given that enactivists broadly conceive of cognition as sense-making, science must be seen as a special and rather complex form of sense-making. From this perspective, scientific realism and objectivism become untenable (Thompson, 2016, p. xxvii). Scientific knowledge must be understood in the interaction between the scientist and its object of study.

As it currently stands, an enactive conception of biology (the scientific field) is directly linked to the enactivist's subscription to Jonas's (2001, pp. 64–98) existential analysis of metabolism. As mentioned earlier (Sect. 2.2), for Jonas, metabolism constitutes a formal identity that stands in a dialectical relation of needful freedom with materiality. This need that characterises the organic identity that arises from metabolism implies a concerned inwardness that transcends itself, linking the organism with its material environment. These ideas stand over the backdrop of the question that motivates Jonas's analysis in the first place: What would a disembodied God mathematician 'see' when gazing at a living organism? This question is meant to question the physicalist and objectivist perspective of modern science. In a nutshell, the perspective of the divine mathematician is a perspective in which objects of experience dissolve, leaving only the 'truer' objective and mathematizable world (Jonas, 2001, p. 75).

From the perspective of the God mathematician, then, metabolism appears as the constant flux of elementary material components. These components may be able to constitute a larger whole, but, according to Jonas, such a whole cannot be taken to be something wholly distinct from its parts: to the metabolic whole "no special reality is accorded that is not contained in, and deducible from, the conjoint reality of the participating, more elementary events" (2001, p. 77). Therefore, the metabolic whole could be reduced to its elementary parts, allowing the divine mathematician to acquire perfect knowledge of metabolism as such by means of knowing its constitutive parts. Metabolism (and more generally, life), then, is taken to be reducible to that which is not life, i.e., material components that by themselves are not alive. This reductionist view allows for purely mechanistic explanations of life.

For Jonas, the problem with such explanations and the reductionist perspective of the divine mathematician is that they would miss the concerned inwardness that is characteristic of metabolic identities, and with it its self-transcendence. Given his existential analysis of metabolism, Jonas considers it obvious that the parts that make up a metabolic identity are "*organized for* inwardness, for internal identity, for indi-

viduality" (2001, p. 90). Put this way, the whole is both more than its parts and a form that is (needfully) free from matter. All this is "entirely outside the grasp of bodyless intellect when confronted with a *res extensa* which […] is nothing else" (Jonas, 2001, p. 90). In contrast, it is all obvious to us who have a living embodiment with its own inwardness and self-transcendence. Therefore, Jonas concludes, life can only be known by life.

As Thompson (2007, pp. 163–164) correctly points out, Jonas's argument is phenomenological and transcendental. Since Husserl, phenomenologists have argued that lived experience has a priority over scientific knowledge because the former is a condition of possibility for the latter. In the context of biology, one may claim that before any theorisation about life, life must be experienced first-hand to be able to recognise it. For Thompson, Jonas's transcendental argument overturns objectivism in biology. One of the main issues with such objectivism is that it shows no concern "for how the category 'organism' is constituted for us in scientific experience" (Thompson, 2007, p. 164). In contrast, Jonas's argument shows that biological knowledge is neither observer-independent nor non-indexical. Since life can only be known by life, all biological research is intertwined with the biologist's pre-theoretical understanding of her own life.

An issue arises here, however. Notice that, in Jonas's argument, metabolism is *first* thematized as involving a self-transcending concerned inwardness and only *then* it is concluded that life can only be known by life. But as the charge of anthropomorphism mentioned at the beginning of Sect. 3 suggests, the attribution of phenomenological properties to all life based on the Jonasian analysis is problematic. I can now claim that this problem arises because of Jonas's strategy: start from an existential analysis of metabolism to conclude that life can only be known by life. But is there a justification for the use of phenomenological properties to analyse metabolism without first arguing that life appears as such only because there is something in common between it and how we *experience* life in ourselves? I do not think so. Without that prior phenomenological explanation of how life is constituted as such, it is unclear why we could use phenomenological categories to analyse life, and eventually conclude that life can only be known by life.

It is here that Husserl's approach becomes useful for enactivism. From the outset, Husserl's claim that biological knowledge is always guided by the biologist's own humanity may appear to be equivalent to Jonas's point. The Husserlian perspective is nevertheless somewhat different from the Jonasian one. Whereas Jonas's claim about how we get to know life is the conclusion of his existential analysis of metabolism, Husserl's views on biology go the other way around. He begins by noting that biology is guided by the scientist's own humanity, and then derives a transcendental conception of biology from that premise. In other words, whereas Jonas, and by extension, enactivists, start from a phenomenological analysis of minimal life (and cognition) as such, Husserl starts from human (self-)experience. This is the reason why the latter considers the role of empathy in biology, whereas Jonas does not do so explicitly (cf. Hverven & Netland, 2023).

I suggest then that the Husserlian proposal points to what could provide the justification needed. As Husserl puts it, biology is possible because of different forms of empathy. "Only from here does the concept of organism draw its ultimate sense"

(Husserl, 2013, p. 6). As mentioned in Sect. 4.2, empathy is the concept phenomenologists often use to refer to how the other is disclosed as another subject as opposed to a thing without any subjective access to the world (see, e.g., Husserl, 1989, §§ 43–47; Stein, 1989). To say that biology is based on empathy calls for a genetic analysis of the empathic experience we have of life, thus providing a phenomenological and explanatory basis for biological science. To be fair, this point is briefly conceded by Thompson:

> [E]mpathy is a precondition of our comprehension of the vital order, in particular of the organism as a sense-making being inhabiting an environment. […] It is this sort of bodily empathy I am invoking now, but widened beyond the human sphere to ground our comprehension of the organism and our recognition of the purposiveness of life. (2007, p. 165)

The problem is that, by following Jonas alone, the role of empathy remains unclear, as well as the need for a genetic analysis thereof. It is because Husserl takes as his starting point the fact that biology is guided by the scientist's own humanity that such self-experience becomes a question.

Realising the role of a phenomenology of the empathic constitution of life entails an enactive conception of biological science. From this perspective, biological knowledge is always intrinsically connected to our self-knowledge and how it allows us to disclose life as such. Notice, however, that the Husserlian and Jonasian perspectives must be seen as complementary in the enactive framework. Enactivists take life and mind to be deeply continuous. One consequence of this continuity is that human cognition is rooted in basic life. This fact is clear in Jonas's (2001) *The Phenomenon of Life*, as well as in Thompson's (2007) *Mind in Life*. Structurally, both books go respectively from metabolism and autopoiesis to image-making in the human mind (Jonas) and enculturation (Thompson). Therefore, both books show how human cognition arises from the basic dynamics of life. But continuity must go both ways. It is not only that human cognition must be rooted in life, but also that our understanding of life is possible because of our human form of cognition. Thus, by phenomenologically analysing human cognition (specifically, how we cognise life) our understanding of life may be enriched, revealing the importance of phenomenology for the enactive conception of life and mind, as well as the enactive conception of biology.

5.2 Sense-making, subjectivity, and constitution

A question that remains open so far is whether there is any need for the phenomenological characterisation of sense-making. I now turn to argue that such characterisation is vital for the enactive conception of life and mind.

Recall that, in its phenomenological characterisation, sense-making implies that the organism has a perspective over its world and that, in recent enactive literature, it has become increasingly unclear how to understand the nature of that perspective. On the one hand, Thompson (2007, 2022) has argued that sense-making does not entail consciousness or sentience. On the other hand, regardless of its original link with subjectivity (Weber & Varela, 2002), enactivists no longer characterise sense-making

as a form of subjectivity but as a precursor thereof (Thompson, 2011b). How should then one interpret the perspective of the organism?

Two of the most evocative thematizations of the perspective of the organism have been elaborated, on the one hand, by Weber and Varela, and on the other hand, by Thompson. When discussing the perspective that arises when an autopoietic unity is formed within a milieu, Weber and Varela (2002, pp. 117–118) call for a reintroduction of the subject into biology. According to them, through its self-organisation, an autopoietic unity distinguishes itself from its environment, thus separating the domains 'self' and 'world'. To conceptualise the latter, they borrow Jakob von Uexküll's (1957) notion of *Umwelt*, which refers to the world as it is *subjectively experienced* by a living organism (for discussion, see Feiten, 2020). Thus, one can think of the world as the intentional correlate of the sense-making subject. As Weber and Varela put it, life is "always subjective in the strong sense of the word" (2002, p. 118).

The connection between subjectivity and sense-making can be fine-tuned by referring to Thompson's recent thematization of sense-making: "'Sense' has the double meaning of 'significance' and 'directedness' […]. 'Bringing forth' means *not just being causally generative but also constituting in the sense of being a condition of possibility for how something shows up* or is present under a certain aspect" (2002, p. 236, emphasis added). The sense of 'constitution' that Thompson mentions is the phenomenological concept of constitution, which can be understood as the subjective disclosure of a meaningful world. Within phenomenology, such a process of constitution is transcendental, i.e., the subject is a condition of possibility for what is constituted. Two points must be clarified here. First, the transcendental claim implies that subjectivity is necessary for there to be a meaningful world, but not that it is sufficient (Zahavi, 2013, pp. 32–33). Second, what is constituted is the world as a horizon of meaning (Husserl, 1960, p. 62). It is not that the subject creates the world as an idealist would have it. Rather, constitution is better understood precisely as a subjective process of meaning-making. These two points are related to Thompson's characterisation of 'sense'. What is achieved via sense-making is not the creation of the world, so to speak. Instead, its achievement is significance or meaning. The bacterium does not create glucose. Rather, glucose acquires significance (i.e., a positive value) through sense-making. Take the bacterium away and such significance disappears. Put this way, sense-making is transcendental constitution, and the organism is a constituting subject.[15] Thus, the perspective that arises with the formation of an autopoietic unit is a subjective one.

Here subjectivity must not be conflated with awareness or phenomenal consciousness. Rather, it must be understood in the phenomenological sense of 'transcendental

[15] Here is another way of making the same point: "Both [the enactive approach and phenomenology] share a view of the mind as having to constitute its objects. […] The mind brings things to awareness; it discloses and presents the world" (Thompson, 2007, p. 15). Given that sense-making is the mark of the mental (Thompson, 2011b, p. 211), it follows that sense-making is constitution in the phenomenological sense. It is nevertheless controversial to link that claim with the further remark that relates the mind to awareness. Thompson (2007, pp. 161–162; 2022) himself has denied that sense-making amounts to awareness or sentience. From this perspective, simple organisms like bacteria must be considered subjects in the broadest of senses, without implying that they are aware or phenomenally conscious.

subjectivity', i.e., as the condition for appearance and manifestation (Zahavi, 2003, p. 48). What appears or manifest transcends subjectivity, but is nevertheless disclosed by it. Here, appearance and manifestation need not be understood as the *phenomenal* givenness of the world in human consciousness. As Eugen Fink puts it, "the theme of phenomenologizing […] is not a *region* or a new *field of being*, transcendental subjectivity *in antithesis to the world*, but that it is *constitutive process* that must be comprehended as the *object* of phenomenologizing" (Fink, 1995, p. 44). To say that the object of study of phenomenology is subjectivity, and more specifically, transcendental subjectivity is simply to say that the phenomenologist is interested in how the world is constituted. It is now clear that sense-making is a form of constitution and, therefore, the object of potential phenomenological analysis. From this standpoint, the organism is a subject in the broadest of senses, and its perspective is subjective and transcendental.

This phenomenological characterisation of sense-making is vital for the enactive approach because it is in virtue of it that sense-making can be properly thematized as a basic form of intentionality, and therefore, as a basic form of cognition. Agency and viable conduct by themselves are not sufficient for intentionality because, given their operational nature, they can be conceived exclusively in causal terms by, e.g., referring to biological mechanisms. But as Thompson's quote on what 'bringing forth' means shows, the bringing forth of meaning through sense-making is not only causal but also constitutive. This step from the operational to the phenomenological conception of sense-making is crucial because, within the phenomenological framework, constitution goes together with intentionality. This is the reason why Thompson remarks that 'sense' in 'sense-making' also means 'directedness'. When the organism makes sense of its environment, it is constitutively directed toward a meaningful world. Importantly, at the fundamental level of constitution, phenomenologists no longer speak about the kind of intentionality that is often thematized in the analytic philosophy of mind, i.e., the property of mental states to be about an object. This kind of intentionality, called object intentionality, presupposes a more basic form of intentionality that phenomenologists call operative intentionality. The latter kind of intentionality refers to the general openness that subjectivity has to the world (see Merleau-Ponty, 1945/2012, p. lxxxii; Bogotá, 2024).

In sum, sense-making must be understood partly as transcendental constitution, implying that the perspective of the organism is subjective. This phenomenological characterisation of sense-making allows for its identification as basic intentionality and opens the possibility of a phenomenological analysis of sense-making. Such an analysis, which must be genetic, would provide a motivational explanation of essential aspects of life within the enactive approach because, as discussed in Sect. 2, for the enactivist life is sense-making in precarious conditions. Put this way, phenomenology not only provides a path toward an enactive conception of biological science but also allows for a phenomenological understanding of life (via the potential genetic analysis of sense-making).

6 Conclusion

In this paper, I have argued that the enactive conception of life and mind requires phenomenology to, on the one hand, properly conceptualise sense-making as intentional, and thus, cognitive; and on the other hand, to call for a non-objectivist biological science. Doing so, I have addressed a gap that, to the best of my knowledge, has not been attended to thus far: the role that phenomenology may play in relation to biology and the enactive conception of life and mind. To do so, I distinguished between the operational and phenomenological characterisations of sense-making. Whereas the former fundamentally relies on the concepts of adaptive behaviour and agency, the latter implies that the organism has a perspective over the world. It is because such a perspective can be linked to the phenomenological concept of constitution, implying that it is subjective (in the broadest of senses), that it can be properly conceptualised as intentional.

The conceptualisation of basic cognition and life as subjective goes together with a reframing of biology as a non-objectivist science. Simply put, life can only be known by life because the biologist is empathically related to the organism she studies. In other words, the organism is disclosed as such from the empathic perspective of the biologist. Phenomenology can analyse this empathic constitution providing the explanatory basis for a non-objectivist biology. In such a biological science, biological knowledge must always be understood as observer-dependent, or, in other words, as a result of how the biologist enacts scientific research. Such enaction is partly a result of the empathic constitution of the organism.

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Declarations

Competing interests The author declares that there is no conflict of interest in the subject matter or materials discussed in this manuscript.

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