

The pragmatics, embodiment, and efficacy of lived experience: Assessing the core tenets of Varela's neurophenomenology

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Abstract

Varela's enactive approach to cognitive science has been elaborated into a sophisticated theoretical framework of agency, sense-making, and sociality. At the same time, Varela's methodological innovation – neurophenomenology (NP) – continues to inspire noteworthy empirical work. We argue that the enactive approach was originally expressed in NP as three core tenets, i.e., (1) phenomenological pragmatics, (2) embodied cognition, and (3) conscious efficacy, yet these two research fields have become largely disconnected. We argue that this disconnect largely hinges on an unresolved tension regarding how to conceptualize the mind-body relationship. Although advances have been made regarding the overarching motivation of bringing cognitive (neuro)science closer to lived experience, Varela may have overestimated the impact of introducing first- and second-person methods on dissolving the traditional mind-body problem. Most efforts in NP have focused on applying tenet 1, while tenet 2 has received notably less attention, and there is even some explicit distancing from tenet 3. We illustrate this situation by way of a critical review of several case studies. We find that NP falls short of its revolutionary ambition to combine all three tenets; it still needs to demonstrate that first-person perspective matters, not only as another source of correlational data, but because a person's lived experience, as such, makes an efficacious difference to their embodied cognition. We conclude that, given tenet 1 is now an accepted tool of human neuroscience, and tenet 2 is slowly receiving more attention, it is time to revisit tenet 3. The development of genuinely experience-involving accounts of embodied brain activity would go hand in hand with a rebooting of neurophenomenology in stronger form.

1. Introduction – The many faces of Varela

One of the most prominent bass notes running through Varela's whole career is his grappling with the tension of correctly characterizing the relationship between our mind and body. And from the beginning he refused to be confined to exploring this tension solely from within the Western tradition of the mind-body problem. Instead, he is more impressed by pragmatic and even contemplative approaches to investigating body and mind, especially as found in certain strands of Buddhism. The title of Varela's (1976) early essay dedicated to the relationship between body and mind is an implicit reference to Zen Buddhist Suzuki's famous formulation

of this relationship as “not two, and not one”. Suzuki’s book starts with a reflection on zazen sitting posture:

This is the most important teaching: not two, and not one. Our body and mind are not two, and not one. If you think your body and mind are two, that is wrong; if you think that they are one, that is also wrong. Our body and mind are both two *and* one. (Suzuki, [1970] 2020, p. 7)

This characteristically paradoxical Zen Buddhist perspective strategically sidesteps the two main contenders of Western metaphysics, namely monism and dualism. What is more, in an unpublished and undated manuscript fragment titled “The Obvious”¹, which Varela likely wrote around the same time, we find an explicit reference to Suzuki. There, Varela explores the possibility that the state of mindfulness resulting from zazen sitting practice can counter an evolutionarily ancient, intrinsic tendency of brain activity, namely its conserved tendency of habituation. The two-page fragment concludes as follows:

The greatest contribution of contemporary continental philosophy is, I believe, to note this obvious state of affairs. Namely, the obvious. That human life finds itself amongst already a given world, a familiar environment in which and from which it has always been living. Being human is to have such a background of familiarity. This is conveniently called tradition. Tradition is our habituation to become older, to grow. In the midst of it we walk and live. We note it when it changes, we don’t see what we don’t see.

Now to the obvious about sitting practice. Suzuki Roshi says (...). In fact, mindfulness is mindfulness of the familiar, of that which is hidden which we want to forget. It is an unnatural act, contrary to the habituating nervous system. It is, precisely, a reminder. A constant waking up. Waking up from the unfamiliar to the familiar, to discover that it is there like the space surrounds a house in which we sleep. (Varela, *The Obvious*)

Yet it is also telling that this fragment remained unpublished, and that the inspiration from Zen Buddhism remained implicit in the published essay (Varela, 1976) in favor of explicit references to post-Hegelian Western philosophy (Merleau-Ponty’s name is briefly dropped, consistent with the appeal to continental philosophy in *The Obvious*). Whether by strategic choice or because of external resistance, the more radical ideas and influences leading to the controversial claim that conscious activity can have efficacy over brain activity did not come out in publication at this time. It has never been easy to break old habits of academia, and as the heady ‘70s came to a close while Varela’s career in neuroscience was on the rise, it is understandable why these ideas and inspirations took a backseat until the time was ripe for their re-emergence, this time in more fully developed form – articulated both in Buddhist and phenomenological terms – in *The Embodied Mind* (Varela et al., 1991).

It is interesting that the fragment gives a much more candid picture of Varela’s thinking than what we find in the published essay, which was originally presented in front of an audience -

¹ Many thanks to Amy Cohen-Varela for the helpful discussions and for sharing this manuscript fragment. It was produced quickly on a typewriter, and its many typos are corrected in the quotations included here.

the “Mind-Body Conference”, which also involved second-order cyberneticists like Bateson and von Foerster (Thompson, 2004).

It is noteworthy that in contrast to Varela’s unpublished reflections on the phenomenological insight that we always already find ourselves living in the world before we begin to entertain reflections about that world, these two influential cybernetics scholars had just published directly opposite claims. For example, von Foerster (1973) had posited that “the environment as we perceive it is our invention”, while Bateson (1971) had claimed that “we now know, with considerable certainty, that the ancient problem of whether the mind is immanent or transcendent can be answered in favor of immanence”. This replacement of one extreme position about reality (internalist representationalism) by another extreme position (radical constructivism) seems to be an oversimplified move from today’s enactive perspective. It is therefore fascinating that this unpublished fragment reveals just how early Varela had realized that phenomenology offers a third way, namely, to reject their shared premise of internalism altogether in favor of starting point situated in the shared lifeworld (Froese, 2011).

Throughout the text of Varela’s (1976) published essay, it is like we can hear him speaking to his influential cybernetics audience, and he knew how to work the crowd. What this indicates is that his published writings are perhaps best interpreted in terms of what he might have called conversational patterns, that is, they are his means of engaging with a specific audience. And more than is perhaps usual in science, we therefore need to take the stance of his audience into account when trying to work out Varela’s own thinking on matters of key importance – for example, because of the unpublished fragment we know that he publicly downplayed his agreement with continental phenomenologists and Zen Buddhists about the primacy of the world-involving basis of experience while presenting his ideas to his second-order cybernetics colleagues. It is as if he adopted a Wittgensteinian approach to philosophy as therapy – given that it would make little sense to directly confront his audience with dropping internalism in favor of a world-involving account of experience, he instead gives a talk that emphasizes the need for experiential transformation to make progress.

As he puts it in an early interview with Joan Halifax², while on the academic conference circuit he feels himself performing somewhat like a bard in the Middle Ages: he gets invited to sing his songs in front of an audience, is hosted for a while, before he must move on again to the next location. In other words, there is some scholarly work still to be done to extract the underlying bass notes from Varela’s diverse repertoire of audience-dependent songs. This is especially the case given that much of his academic work, like the methodology introduced as neurophenomenology (NP), was and still remains challenging for traditionally-oriented cognitive science (Bockelman et al., 2013).

As a contribution to this outstanding endeavor, we propose that there are three bass notes that are particularly crucial for understanding Varela’s oeuvre. They can first be tentatively heard in these early writings, but finally come out in full volume in *The Embodied Mind*, and especially with Varela’s inauguration of the NP research program (Varela, 1996). The three core tenets of NP are:

² This interview is included as part of Franz Reichle’s documentary *Mind and Life – Early Dialogues*.

1. *Pragmatics*: Lived experience must be practically investigated with domain-relevant tools and with equivalent systematic rigor as is brain activity.
2. *Embodiment*: Brain activity must be properly contextualized as embodied in a living organism in constant interaction with the world.
3. *Efficacy*: The lived experience of an agent's sense-making behavior must be granted some efficacy over brain-body activity.

All three tenets can be considered as challenging to traditional cognitive science in their own right. Hence the NP research program, which aims to integrate all three into one coherent methodology, is exceptionally challenging. Still, since its inauguration in the 90s, the use of first-person methods (tenet 1) has slowly become integrated into the methodological toolbox of cognitive neuroscience, especially in the field of contemplative neuroscience. And there has also been a growing consideration of the role of the body (tenet 2), most recently in the context of the gut-brain axis. In comparison, the causal efficacy of conscious experience (tenet 3) is still not a widely studied topic, apart from the neuroscience of free will, but where it usually is approached in the context of reductive physicalism. In contrast, NP is explicitly defined as a non-reductive approach to the study of the “causal efficacy of consciousness—that aspect of consciousness in virtue of which we human beings (and other animals) qualify as conscious agents” (Varela and Thompson, 2003). Moreover, this definition reveals that all three tenets hang together: it is through our own first-person perspective (tenet 1) that we experience the role of the body (tenet 2) in realizing conscious intentions (tenet 3). Accordingly, the NP research program is, as Gallagher and colleagues (2015) put it, the real “hard” science:

NP resists the third-person objectification of what is rightly first-person subjective, and it values the unique source of data provided by an experiencer. Thus, scientists should not simply eliminate subjective experience and first-person accounts because they do not fit neatly into the rigid practices of most “hard science” (Bockelman et al., 2013). The real “hard” science, the difficult science, is the science that attempts to find ways to integrate first-person data with third-person data and to account for both neural and extra-neural factors. (Gallagher et al., 2015, p. 67)

On this view, the ideal NP study would be one capable of speaking to all three tenets. However, while there have been notable successes with regards the first tenet, and some advances have been made toward the second, the third tenet has been largely untouched. In sum, no NP studies have, as of yet, successfully managed to incorporate all three tenets into a single experimental paradigm. There are exceptions, but for a methodology developed by Varela in the context of the enactive approach, it is striking that for much of the history of NP there has been little concern to go beyond the classical “neuro-centrism” of cognitive neuroscience, i.e., by systematically taking into account the brain's embodiment and situatedness in the world (Beaton, 2013). And there has been even less appetite for returning to the hard problem of consciousness (Chalmers, 1995), i.e., by working out how to make the necessary conceptual space such that human experience can play a substantial or causal role in embodied action. Perhaps some of this reluctance is informed by Varela's formulation of neurophenomenology as a solely methodological solution, not a “theoretical fix”.

Still, there is an internal coherence to Varela's efforts in the '90s. It is insightful to recall that Varela launched the NP program alongside an article presenting his core hypothesis on the emergence of mental-cognitive states into primary consciousness:

Core Hypothesis: Mental-cognitive states are interpretations of current neural activity, carried out in reference to a transient coherency-generating process generated by that nervous system. (Varela, 1995, pp. 90-91)

In light of this core hypothesis, we can see the main strands of Varela's efforts in the '90s falling into place:

- i. *The NP program* is needed to systematically work out what is happening on the side of primary consciousness by bringing in disciplined first-person methods (Varela, 1996);
- ii. *The enactive approach* is needed to ensure that the core hypothesis is not framed in terms of an internalist brain-identity thesis, but that brain activity is contextualized as part of cycles of organismic embodiment at various levels of description (Thompson and Varela, 2001, Varela et al., 1991); and
- iii. *Autopoietic theory* is needed to develop an account of how an organism is capable of taking up such an "interpretative" stance or concerned perspective that brings out the significance of its own dynamics (Varela, 1997).

The rich links between these three different strands of Varela's research have already begun to be articulated by others (Thompson, 2004, e.g., Rudrauf et al., 2003, Thompson, 2007). What is implicit in all three strands, but which is absent as an explicit dedicated strand of research in its own right, is the question of conscious efficacy. Indeed, an assessment of the general status of the NP program by some of Varela's closest colleagues, following nearly a decade of NP research, came to a rather modest conclusion regarding its originally stated ambition to rework the mind-body problem:

At a more abstract conceptual level, neurophenomenology aims not to *close* the explanatory gap (in the sense of conceptual or ontological reduction), but rather to *bridge* the gap by establishing dynamic reciprocal constraints between subjective experience and neurobiology. At the present time, neurophenomenology does not claim to have constructed such bridges, but only to have proposed a clear scientific research program for making progress on that task. (Thompson et al., 2005, p. 89)

An important insight of this assessment of the NP research program is that it highlights what would in principle count as a successful answer to the mind-body problem. NP shifts the criterion of success away from the impossible ideal of closing the gap between the domains of mind and matter that would require an elimination of their distinctive differences, toward a possible bridging of the gap that depends on respecting their differences. This shift is crucial because it highlights that such a non-reductionist approach, while initially appearing to give up on closing the gap too soon, may ultimately be scientifically more feasible: for as long as workable bridges can be constructed over the gap between body and mind in the first place, it is less of a worry that parts of the gap below the bridge remain obscure. This unavoidable obscurity may even turn out to be an essential part of what it means to respect mind and

body's distinctive differences. However, the sobering conclusion at that stage was that, even by shifting the explanatory goal posts, for NP the mind-body problem remains a considerable challenge. The situation is not different a decade later, with Gallagher and colleagues (2015) explicitly separating their substantial contributions to the NP research program from the mind-body problem.

Another way of putting this is that, in spite of Varela's insistence on the importance of lived experience for cognitive science, the various research strands which he launched have not become integrated into a scientific theory of consciousness with the kind of systematicity and level of detail that is nowadays expected of such theories (e.g., Seth and Bayne, 2022).³ We may wonder why a research program that has for over a couple of decades dedicated itself to "neurophenomenology" has not given rise to a more productive science of consciousness. Is the revolutionary ambition of NP perhaps misguided after all? Or, alternatively, has it not yet been given enough of a shot on its own terms to see where it may still take us?

With this in mind, in what follows, we will examine both classic and recent examples of NP with an eye as to which lessons can be gained. The aim is to uncover clues to help us to revisit the theoretical foundations of this research program to examine how it can continue to develop in-line with Varela's initial aspirations.

2. Neurophenomenology (NP): Four case studies

In this section we provide a brief overview of four illustrative studies in NP, including a pioneering study and three studies that were published in the last five years. We acknowledge that there is a large amount of literature that is relevant to NP even when it does not identify with NP explicitly. However, here our focus is on neuroscientific studies that explicitly refer to the tradition of NP as formulated by Varela. Our emphasis will be on assessing to what extent these studies reflect Varela's three tenets of NP that we identified in the introduction.

2.1 Case 1: Preictal experience (PIE) – the 'Paris Group'

A paradigmatic and pioneering exemplar of the neurophenomenological approach can be found in a series of studies conducted by Varela and colleagues throughout the late '90s and early '00s, sometimes termed the 'Paris Group' (Navarro et al., 2005, Petitmengin et al., 2006, Petitmengin, 2009, Le Van Quyen et al., 2001). These studies employ what may be called an 'operationalized *epoché*' (Sykes, 2021), inspired by Husserl's phenomenology and redeployed as a qualitative measure to obtain more reliable first-person data (Varela and Shear, 1999), particularly in its dynamic and pre-reflective format (Petitmengin et al., 2007).

One of the earliest applications of this first-person method was to epilepsy (Le Van Quyen et al. 2001; 2005); more specifically, the correlated experiential and neurophysiological profile occurrent immediately before a seizure's onset (*ictus*). This 'preictal stage' (before seizure

³ However, it may be worth noting that many phenomenologists explicitly formulate the phenomenological research program as a descriptive methodology, and not as a theory of consciousness as such. For example, Heidegger largely eschewed talk of 'consciousness' altogether, likely because he believed the dominant formulation of the term indebted to a Cartesian paradigm.

onset) features a specific neural signature characterized by desynchronization of the neural populations surrounding the epileptic focus, which had previously been assumed to begin five minutes prior to seizure. They aimed to discover whether the preictal stage was characterized by a phenomenological profile that matched the neurophysiological profile of the preictal stage of the seizure. Accordingly, the operationalized *epoché* was applied to patients recalling preictal experiences (PIEs). Unexpectedly, PIEs were found to begin hours before seizure onset. Subsequent reanalysis of the intracranial EEG data, guided by this first-person data, found the neural signature of the preictal stage (decreased neural synchronization) in fact also begins around five hours prior to the seizure (Petitmengin, 2009, Petitmengin et al., 2006). Thus, a more extended correlation between changes in first-person experience and in neural activity was first uncovered by combining neuroimaging (third-person quantitative) and phenomenological (first-person qualitative) measures. This is a key proof of concept.

The qualitative data's validity, and thus its clinical application, was dependent on the rigor of the operationalized *epoché*. And the studies were driven by a clear clinical motivation, since enabling patients to take protective measures before seizure onset can drastically minimize the risk of serious injury (Petitmengin, 2009). Moreover, as noted by Varela and Thompson (2003), previous studies have found evidence suggesting that engaging in a mental task can prevent seizure onset. However, precisely *how* the first-person perspective was supposed to be able to make a difference to brain activity was not made explicit. Indeed, the goal of these studies was not to provide an ontological account of the relationship between the traditional categories of mind and matter, but to rather the pragmatic goal of ascertaining potential medical applications of a methodology based on NP.

In summary, the epilepsy studies clearly addressed the first tenet of NP, *pragmatics*, but they were less concerned with relating it the second (*embodiment*) and third (*efficacy*) tenets. The focus remained squarely on brain dynamics without much consideration for roles of the rest of the body nor its interaction with the environment. And while a crucial motivation for these studies was to enable patients to become more aware of preictal changes in their experience so that they could better take appropriate countermeasures, the studies did not elucidate how any change in personal-level lived experience *as such* could make a difference to the sub-personal neural processes. In other words, while the guiding intuition is akin to that found in Varela's unpublished fragment, where he considers how zazen meditation overrides intrinsic habituating tendencies of brain activity, we are left without any explanatory mechanism of how this could be so. Following tenet 3 on efficacy, it seems that this assumed interaction or interdependence between lived experience and brain activity goes beyond what is allowed in the framework of supervenience theory or mind-brain identity theory, but the details of how this alternative notion of efficacy is supposed to operate are not spelled out.

2.2 Case 2: Near-Death Experience (NDE) – Martial et al. (2019)

A recent study which follows the investigative logic of NP first developed by Varela and co-authors is that of Martial et al. (2019). At a methodological level, they chose to use a NP approach whereby both first-person phenomenological data and third-person neurophysiological data are linked and then can be analyzed in a "mutual constraint" relationship. Furthermore, since people vary in their ability to generate and report first-person experience, they employed techniques that potentially helped the subjects to become

aware of previously unavailable or inaccessible aspects of their experience. They claim that thanks to this NP approach, they obtained phenomenologically enriched neurophysiological findings.

Like the epilepsy studies, this study takes aim at another relatively uncommon experiential category: near-death experiences (NDEs). Martial and colleagues begin with the premise that the neurobiological bases of NDEs remain largely mysterious. A major obstacle to reducing this mystery is the difficulty in circumscribing neural activity corresponding to the NDE itself from confounds. In service of this research goal, they tested a small sample size ($n=5$) of subjects who had experienced a positively valenced NDE. Participants were instructed to re-experience both their NDE and another positively valenced experience both during normal consciousness and whilst undergoing hypnosis. High-density EEG was recorded throughout the interview to confirm the measurable, objective 'reality' of the NDE experiences as a valid category, as disclosed by the phenomenological measure.

They found that NDE-related phenomenology correlated with increased alpha activity in frontal and posterior regions, which was interpreted as a proof-of-concept for experimentally studying NDEs and disentangling their neural signature. As the authors suggest, the positive valence of NDE experiences may prove useful in clinical and therapeutic contexts. Accordingly, as with the epilepsy studies, the confirmation via neuroimaging that the recalled NDE experiences are indeed measurably distinct from other forms of cognition features practical merit.

However, in both this study and the epilepsy studies, the phenomenological purist may take issue with the fact that the phenomenological data was taken from *memories* of the phenomena in question (i.e., PIEs and NDEs). Nonetheless, as the authors of both studies state, the kind of lived experience under investigation essentially precludes any kind of ecological, world-involving investigation: experimenters cannot induce seizures or near-death situations in laboratory settings for purposes of cognitive science. Accordingly, these two NP studies exemplify the claim that neurophysiology can benefit from taking tenet 1 of NP seriously. However, they largely sidestep a fuller engagement with tenets 2 and 3, and understandably so, given the non-ordinary state of experience being investigated.

2.3 Case 3: Anomalous Self-Experience (ASE) – Nelson et al. (2020)

Nelson and colleagues (2020) adopted a different strategy of cross-disciplinary integration in their investigation of anomalous self-experience (ASE). They employed what they label a testable neurophenomenological *model* of schizophrenia spectrum disorders (SSD). A wide variety of measures were employed in this experiment – EEG, neurocognitive measures, and clinical measures such as Examination of Anomalous Self-Experience (EASE). However, in contrast to the previous two NP cases, phenomenological methodology was not injected at the level of first-person data collection. Instead, the authors utilized conceptual resources already provided by clinical phenomenology, particularly those pertaining to the minimal self (Maj, 2012, Nelson et al., 2014). The phenomenologically-informed theoretical model was then tested with traditional methods employed in clinical neuroscience, with the authors claiming that the neural correlates of such disturbances had remained unclear.

More specifically, by drawing upon prior “theoretical neurophenomenological models that proposed that source monitoring deficits and aberrant salience”, the authors speculated there may be “neurocognitive/neurobiological processes that correlate with minimal self-disturbance on the phenomenological level” (p. 2). Clinical phenomenology thus provided and refined the theoretical notion of the minimal self and posited its disruption in SSDs, while Nelson and colleagues aimed to expand the literature by empirically testing how these notions interface with related clinical notions and measurable neural signatures. Specifically, they investigated Healthy Control, Ultra-High-risk (UHR) and first episode of psychosis (FEP) populations and expected to find a “increasing gradient of severity from HC to UHR to FEP individuals (HC < UHR < FEP)” (p. 4), which they note was partially supported in the final analysis. The authors also found relationships between the constructs of ‘aberrant salience’ and ‘general psychopathology’ as well as between ‘source monitoring deficits’ and ‘disturbed self experience’. However, contrary to expectations, no relationship was found between ‘aberrant salience’ and ‘disturbed self-experience’, with the authors noting that aberrant salience may in fact be more involved with disturbed *world* experience.

Underpinning this study is the important insight that a NP-informed model provides a more comprehensive description of symptomatology than standard models: “the data presented here and in other related recent research shows an emerging picture of neuro-features of core phenomenological aspects of schizophrenia spectrum disorders *beyond surface-level frank psychotic symptoms*” (p. 14; emphasis added). This supports Varela’s driving sentiment that folk-psychological and/or unrefined experiential categories are sub-optimal as explanatory targets for neuroscientific research, and that obtaining phenomenologically refined descriptions may lead to the discovery of new neural correlates. Yet again, despite some reference to disruption in holistic world-experience, there was comparably limited concern for tenets 2 and 3 of NP.

2.4 Case 4: Non-ordinary States of Consciousness (NSC) – Timmermann et. al (2023)

In a review paper, Timmermann and colleagues (2023) assert that NP is uniquely positioned to investigate so-called ‘non-ordinary states of consciousness’ (NSCs). NSCs can include a wide range of experiences induced by hypnosis, meditation and/or psychedelic use. Timmermann and colleagues provide an overview of extant NP studies on NSCs and propose to unify them in a coherent conceptual framework. Studies cited in the paper include research on space, time, and body experiences in mindfulness meditators (Berkovich-Ohana et al., 2013, Dor-Ziderman et al., 2016); visual imagery and sense of agency while under hypnosis (Cardeña et al., 2013); and altered experiences caused by the psychedelic drug DMT (Timmermann et al., 2019). As well as employing phenomenological interview methods, the studies correlated their findings with the neuroimaging methods MEG and EEG.

Justifying a NP approach to the study of NSCs, Timmermann and colleagues cite the unreliability of naïve first-person reports. Additionally, the reciprocal importance of NSCs to the wider field of the cognitive sciences is found in their relevance for mental and physical health, in addition to the fact that NSCs can aide research by way of increasing or decreasing the salience or intensity of psychological phenomena in experimental settings. As such, the authors seemingly advocate for a kind of ‘breakdown’ logic (present in Heidegger’s

phenomenology and popularized by Dreyfus) to be operative in the investigation of consciousness by examining its perturbations in NSCs, whereby an alteration in a phenomenological structure renders its regular structure more transparent (see also, Shanon, 2003). As with the ASEs of the previous case study by Nelson and colleagues, in addition to meriting study in their own right, NSCs can help disclose the general structure of experiences via alterations to that structure. Thus, NP and the study of NSCs are posited as mutually informing.

In their review, we are offered examples as to how not only tenet 1 can be deployed, but also 2 and 3. For instance, in connection with tenet 3, Timmermann and colleagues cite evidence that meditation can produce an observable effect on neurobehavioral experiments, which resonates with Varela's unpublished reflections from the 70s. For example, they refer to findings that habitual meditators display greater predictive validity during the Libet paradigm (Jo et al., 2014, Jo et al., 2015), which is an important experimental paradigm for discussions of the causal efficacy of consciousness. They note:

“Compared to non-meditators, meditators seemed to be aware of subjective concomitants of negative deflections of the slow cortical potentials that precede actions (i.e., button presses), which could reflect the crucial feature of being able to initiate the usually unconscious processes of a voluntary movement with awareness” (p. 144)

Also notable is that, in line with Gallagher and colleagues (2015), Timmermann and colleagues explicitly give more weight to the 2nd tenet of embodiment:

“Broadening this idea, the embedded nature of NSCs requires that methodologies for their study explicitly recognise and mobilise context and culture-specific settings (i.e., disciplined forms of know-how) in contemporary scientific settings... Consequently, an NP approach to NSC involves characterizing the interplay between brain, body, and environment at multiple spatial and temporal scales, and thus provides an opportunity to approach the study of consciousness beyond identifying mere brain-bound correlates.” (p. 12)

Looking ahead, Timmermann and colleagues propose that the influence upon brain and lived experience conferred by the situational context might modulate hypnotic suggestibility and shape the psychedelic experience, which “can allow the investigation of the plastic and dynamic nature of experience from a multiscale perspective that includes mind, brain, body, and context”. Even atypical experiences, then, can potentially be explored as world-involving, providing supporting evidence for the importance of tenet 2.

3. Discussion

In each of these case studies, phenomenological resources were operationalized either in the format of a data collection method or as a psychological model, comparable to models or measures of equivalent psychological domains or disorders. Do these studies continue to pursue Varela's original goal of incorporating phenomenology into neuroscience? And can the resulting scientific methodology still justifiably be labelled 'phenomenological'?

We tentatively argue yes on both counts. At its fundament, NP contains something of the structure of investigation developed by Husserl, namely that naïve descriptions of experience should be supplanted by more methodologically rigorous descriptions of experience (Depraz, 1999, Petitmengin, 2006). Contemporary NP thus remains archetypally phenomenological insofar as it rejects descriptions of experience found in ordinary language in favor of those that are phenomenologically informed. Subsequently, a heightened awareness of experience is attained, in the first- and/or second-person mode (i.e., by the participant or experimenter, respectively). Furthermore, phenomenological measures are able to catalogue pre-reflective experiences that other first-person measures often miss (e.g. questionnaires), insofar as they focus on the reflective thoughts, beliefs or judgements of experimental subjects (Petitmengin, 2007). The novel claim of *neurophenomenology* is that these newly won descriptions of pre-reflective experience feature measurable neural correlates that would otherwise remain inaccessible to experimental investigation. The NP studies cited above appear to empirically support this claim. From the perspective of mainstream neuroscience, then, phenomenology is a valuable method for disclosing replicable experiential categories that correspond with replicable neurophysiological signatures.

One general experiential category is particularly striking: as Timmermann and colleagues (2023) explicitly highlight, NP has found repeated success by studying various NSCs (e.g., epileptic seizures, psychiatric disorders, near-death experiences, hypnotic, psychedelic or meditative states, etc.). One reason for this focus on NSCs may be that the epistemological benefits otherwise conferred by ‘bracketing’ are already partially present at the outset: NSCs are less bogged down by superfluous or confused descriptive categories that could impede their scientific investigation, while also requiring some phenomenological method to capture them accurately. From the empirical side also, NP may help to mitigate disadvantages that result from practical limitations regarding obtaining a large sample size: given that it is difficult to remove variability by averaging, the variability could instead be captured by a more fine-grained analysis of first-person experiences (Lutz et al., 2002). In other words, NP has found a productive niche in human cognitive neuroscience focused on lived experiences which are difficult for the layperson and scientist alike to immediately relate to, due to being outside of the spectrum of common, everyday acquaintanceship.

By contrast, paradigmatic examples of classically oriented phenomenological inquiry have tended towards more general, fundamental phenomenological domains such as perception, temporality, or embodiment *as such*. And some of the earliest examples of NP conducted by Varela and his close collaborators have also investigated themes of temporality (Varela 1999) and visual perception (Lutz and Thompson 2003). However, their recent work has focused on how to make non-ordinary states more accessible for empirical investigation, for example by training the minds of the participants (Lutz et al., 2015) and by creating immersive environments (Gallagher et al., 2015). Why there is currently an almost exclusive focus on NSCs in much of NP remains open for speculation.

We note that, although the contemporary instantiations of NP remains consistent with Varela’s original methodological programmatic, it is worthwhile to assess whether they hold up to all his aspirations for the NP program. The case studies analyzed here rely primarily on what we identified as tenet 1 – pragmatics. Thus, NP contributes to the search for neural correlates of consciousness, while abiding by the standards of mainstream neuroscientific

practice, and more generally remaining ontologically and metaphysically neutral (Pace Giannotta, 2021). As such, it is not clear how any mind-brain correlation yielded by NP could, as Varela had wished, provide compelling evidence against epiphenomenalism or Cartesian dualism (Di Francesco and Tomasetta, 2021). On this view, NP appears most compatible with an embodied variant of mind-brain identity theory (e.g., Myin and Zahnoun, 2018).

Perhaps this is another reason for the current focus on NSCs: given that NP does not have a unique theory of how the brain works, there is so far little additional insight to be gained from applying it to everyday examples of lived experience to elucidate their neural and bodily basis. Similarly, the focus on NSCs is understandable given that NP's commitment to tenet 2 – embodiment – still remains in its initial stages: there are isolated attempts at expanding NP to body physiology (Depraz and Desmidt, 2019) and behavioral and social interaction dynamics (Froese and Fuchs, 2012, Froese et al., 2020), although none of these has included brain activity in the analysis as of yet. Accordingly, a systematic integration of extracranial variables with lived experience and brain dynamics is notably lacking.

A step in this direction was recently taken by Dumas and colleagues (2020) in the context of social cognition. Indeed, a promising direction for NP is to include more consideration of the constitutive role of others, in line with Varela's (2000) own expectations regarding the future of NP. So-called "hyperscanning" brain imaging technology has been becoming more readily available for the neuroscientific study of two or more people engaged in real-time social interaction. More generally, this advance also holds promise to broaden the third tenet of embodiment to include the body-, world-, and other-involving bases of conscious experience, finally bringing NP in line with its original encompassing vision of "radical" embodiment (Thompson and Varela, 2001).

4. Conclusion

Most effort in NP thus far has focused on demonstrating the validity of tenet 1 – the use of a disciplined phenomenological pragmatics in cognitive neuroscience. While this has yielded results recognized as valid and innovative, tenets 2 and 3 – embodiment and efficacy – remain vastly under-explored, both methodologically and theoretically. Indeed, tenets 2 and 3 are not independent; it is easier to ignore questions regarding the efficacy of consciousness if, in the experimental context, participants are not actively or meaningfully engaged in embodied interaction with the world. The kinds of experiences covered in our case studies, i.e., PIEs, NDEs, ASEs, and NSCs more generally, seem to largely avoid questions regarding active world-involvement. As stated, there are valid reasons for adopting this traditional narrow or restricted scope of cognitive neuroscience in those experiments. As it stands, however, NP's underdevelopment regarding the embodied and efficacious first-person perspective entails that its three tenets remain somewhat disjointed, to the extent that studies adopting NP as a methodology that achieves success in only 1 could still potentially be interpreted in a way that is agnostic or even in tension with respect to tenets 2 and 3.

We propose that future NP research can be substantially strengthened by more explicitly engaging with tenets 2 and 3, which will require a much closer dialogue with Varela's other enactive research strands. In return, those more theoretical strands would also benefit from this closer engagement with the practical concerns of experimental research – what would a

specifically enactive approach to neuroscience look like? Could it form the basis for an enactive theory of consciousness? What does it say about how we should go about integrating extracranial variables into analyses of brain activity? This would be a timely endeavor as there is increasing appetite in mainstream neuroscience to revisit its traditional assumptions regarding the brain-behavior relationship (Westlin et al., 2023).

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