Brain Patterns Shaping Embodied Activities of Their Bodily Limbs in Perception and Cognition

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Abstract

This essay aims to expose the metaphysical underpinnings of enactivism. While enactivism relies heavily on rejecting the traditional mind-body problem by excluding the familiar thought experiments that favor phenomenal dualism, the crucial point that is overlooked is instead the brain-body problem, specifically the crucial interaction between the brain and the bodily limbs in their embodied activities of perception and cognition. If enactivism is correct, differences in sensory experience necessarily entail differences in embodied activity—this is the metaphysical core of enactivism, which we think is entirely wrong. We will argue that a physical or biological body ("Körper") is configured or shaped into a perceptually living body ("Leib") by brain patterns and not by embodied activity or by the so-called sensorimotor contingencies. Undoubtedly, embodied actions influence sensory perception. However, since variations in embodied actions do not necessarily lead to variations in sensory experience, they are not metaphysically constitutive of these experiences (supervenience claim).

Keywords: Enactivism; Phenomenal Externalism of Enactivist Provenance; Know-how.

Introduction

The term "enactivism" was introduced into cognitive science in 1991 by FRANCISCO VARELA and colleagues. The authors' source of inspiration is explicitly the phenomenology of MAURICE MERLEAU-PONTY:

> *We like to think of our journey through this book as a modern continuation of a research program founded a generation ago by the French philosopher Maurice Merleau-Ponty. By continuation, we do not mean academic follow-up to Merleau-Ponty's thinking in the context of contemporary cognitive science. We want to say that Merleau-Ponty's writings inspired and guided our orientation here. (VARELA et al., 1991, p. XV, our translation)*

However, it was not until ten years later that the doctrine gained prominence thanks to the significant contributions of ALVA NÖE (2004, 2005), SHAUN GALLAGHER (2005, 2014), EVAN THOMPSON (2007, 2014), and most recently, DANIEL HUTTO and ERIK MYIN (2013, 2017). While LUDWIG WITTGENSTEIN's soft behaviorism (2001) has also become an indispensable source for authors such as Nöe, Hutto, Myin, and others, Merleau-Ponty's phenomenology remains a crucial reference.

The enactivist movement is divided by SHAUN GALLAGHER and MATT BOWER (GALLAGHER AND BOWER, 2014, p. 233) into three main periods: the "early" enactivism of Varela and consorts, the "middle" enactivism promoted by ALVA NÖE in 2004, and the "latest" and radical enactivism of DANIEL HUTTO and ERIK MYIN. The 1991 compendium by Varella and colleagues is part of the first phase. It begins with a critique of the cognitivism of JERRY FODOR (see FODOR, 1975, 1983), which focuses on mental representation. The enactivists offer cognition as embodied action as a counterargument to this cognitivism.

The significant contributions of ALVA NÖE are the brandmark of the second phase of enactivism. His main inspiration comes from the Wittgensteinian tacit claim that cognition is embodied sensorimotor contingency or know-how. Noë's views on representation, however, are somewhat ambiguous. In some of his works (2005, p. 246), he proposes to abandon the concept of representation altogether, while in others (2004, p. 75), he assigns it a subordinate role. Moreover, Noë seems to adopt the enactivist version of phenomenal externalism, as opposed to the concept of internal physical state. We will revisit this issue in the penultimate section.

A radical break marks the third and final phase with the idea of representational content. Perceptual experiences are a kind of activity rather than a representation (HURLEY, 1998; HUTTO & MYIN, 2014; NOË, 2004; O'REGAN, 2011; ORLANDI, 2011; THOMPSON & VARELA, 2001). The relevant contributions here are by Hutto and Myin. They defend what they call the "radicalized" version of "enactivism" - REC." The leitmotif is "going wide!" (i.e., to appeal to world-encompassing interaction processes in cognitive science explanation). It is no longer just a matter of dispensing with the concept of the mental image but even with what we now understand as content. But while Noë is reluctant to abandon the concept of content, Hutto and Myin's strategy of "Going Wide While Staying In" seems to preclude an extension of REC to a theory of phenomenality or consciousness. That said, it is difficult to understand how differences in sensory experience necessarily entail differences in embodied activities that result from interaction with the external world.

We can still pinpoint one or more central ideas that define enactivism's essence even though it has undergone various iterations or phases. First, regardless of whether they accept or reject the idea that sensory experience has representational content, they all believe that conscious experience is not metaphysically determined by what experience might represent: sensory experience is not essentially representational. In contrast, enactivists claim that differences in embodied activity result in variations in sensory experience because they believe that an organism's embodied action is metaphysically constitutive of both perception and cognition (see NÖE, 2004; DI PAOLO et al. 2010, 2014, pp. 39-40). They, therefore, disprove the idea that perception is merely a passive way of taking in the world (see STEWART 2010/2014, p. 3). Finally, they assert that for this embodied activity, the interaction between the organism and environmental factors is crucial (see STEWART 2010/2014, PP. 1-4; THOMPSON, 2007).

Although not a complete theory, enactivism has generated considerable controversy. First, the earlier enactivism of Varela and his colleagues seems to represent a naive anti-realism in which embodied sensorimotor action constitutes both the subject and the world. This epistemological constructivism, which denies the existence of an objective reality, goes directly back to Merleau-Ponty (1945, p. XV, emphasis added):

> *The philosopher tries to conceive the world, others and himself and their interrelationships. But the meditative ego, the 'impartial spectator' (**uninteressierte Zuschauer**), **does not rediscover an already given rationality, they establish themselves, and they establish it, by an act of initiative that has no guarantee of being**, its justification resting entirely on the effective power it gives us to bring our own history upon ourselves.*

In addition, the enactivist critique of the theory of representation is unsatisfactory because they understand the notion of representation ambiguously. They consider representation as a mental image that "would represent the external world inside the brain" and as representational content. Varela and his colleagues acknowledged this ambiguity in their work (1991, p. 135, emphasis added) by stating,

> *This sense of representation (Representational content) is **weak because it does not have strong epistemological or ontological commitments**. Therefore (...) it is perfectly acceptable to think of a statement as representing some set of conditions without making further assumptions about whether the language as a whole works that way or whether there really are facts in the world separate from the language that can be represented by the sentences.*

In the first sense, the notion of representation, with its "strong ontological commitments," goes back to traditional theories of sense data: those who posit "representations" are ontologically committed to these strange entities as "mental proxies" of worldly entities, namely sense data. But what about the "strong epistemological commitments?" Everything seems to indicate that "representations" are the epistemic mediators (mental proxies) between the subject and the world (indirect realism). None of the commitments will be discussed here.

In the second case (b), the enactivist argues against the claim that experience has a content analogous to the content of propositional attitudes. Accordingly, the experience would represent the world according to certain satisfaction conditions that the world would or would not satisfy. As Varela and colleagues acknowledge, this second notion (b) as representational content does not involve "strong ontological and epistemological commitments" as does the first (a). Ultimately, neither (a) implies (b) nor vice versa: (b) does not imply (a).

But what about the second sense of representation as content? The existence of visual illusions is the main reason for the content view. When we see an object with properties it does not have or without properties it does have, we misrepresent the visual scene. The key idea is that representation occurs whenever there is a chance of misrepresentation (DRETSKE, 1986). Enactivists, though, could object that understanding the concept of a visual illusion is not content-dependent and can be done fairly effectively without it. They may counter that an illusion is an experience in which the visual system

exhibits a typical response to a certain feature in the absence of that feature. No one assumes that the visual experience is typically accurate, which is the issue with this response (see BLOCK, 2023, p. 30).

Third, it is semantically impossible to accept cognition as a kind of know-how and perception as sensorimotor know-how (Nöe). JASON STANLEY and TIMOTHY WILLIAMSON (see STANLEY AND WILLIAMSON 2001) deconstruct this common creed (i.e., the thesis that possession of a concept is equivalent to knowing how to operate or use it correctly) with one of the best semantic analyses we know, Prayers in the Know-how Form. We devote an entire section to fighting such a creed. However, we will appeal to empirical cases and our pretheoretical intuitions about such experiments rather than proceeding with semantic analysis.

Fourth, the enactivist credo inspired by the ecological psychology of JAMES J. GIBSON (1986), according to which perception is metaphysically constituted by "affordances," is entirely counterintuitive. As far as we know, representations of objects and properties as constants of perception constitute objects and properties as providers of embodied action, not vice versa.

Another problem arises when one tries to develop enactivism from a theory of cognition to a theory of phenomenal consciousness (Nöe, 2005). It is difficult to see how embodied sensorimotor contingencies (or "laws of activity") could account for the fundamental difference between conscious and unconscious perception.

Block, however, points out the crucial error: "sensorimotor contingencies affect experience, not that experience is partly constituted by or supervenes constitutively on "embodied activity" (2006, p. 263). Certainly, sensorimotor contingencies affect perception. Nevertheless, perception does not supervene on sensorimotor activities, for it is false that there can be no perceptual differences if there are no differences in sensorimotor activities. It is wrong to assume that differences in perception also presuppose differences in embodied sensorimotor activity.

This essay aims to expose the metaphysical underpinnings of enactivism. While enactivism relies on the traditional mind-body problem in rejecting the familiar thought experiments that favor phenomenal dualism, the critical point overlooked is instead the brain-body problem, specifically the crucial interaction between the brain and the bodily limbs in their embodied activities in perception and cognition. If enactivism is correct, differences in sensory experience necessarily entail differences in embodied activity-this is the metaphysical core of enactivism, which we think is entirely wrong. We will argue that a physical or biological body ("Körper") is configured or shaped into a perceptual, living body ("Leib") by brain patterns and not by embodied activity or by the so-called sensorimotor contingencies.[1]Undoubtedly, embodied actions influence sensory perception. However, since variations in embodied actions do not necessarily lead to variations in sensory experience, they are not metaphysically constitutive of these experiences (supervenience claim).

This essay is organized into three sections and a conclusion. In the next section, we will address how enactivism supports a behaviorist fallacy by incorrectly assuming that know-how does not involve propositional meaning and that perception can be reduced to sensorimotor contingency or know-how. In the following section, we will present two anti-enactivist arguments. The first argues that the relationship between perception and bodily members is not essential but somewhat contingent. The second argues that brain patterns shape embodied activities of their bodily limbs in perception and

cognition, not the other way around.

The third and final section of this article is devoted to a critique of the alleged phenomenal externalism of enactivist provenance. Undoubtedly, enactivists reject the claim that sensory experience is essentially representational, that is, phenomenal differences necessarily entail representational differences. Yet everything seems to indicate that enactivism assumes that differences in phenomenal experience necessitate variations in embodied activity. Does this mean that enactivism advocates a kind of phenomenal externalism? As noted earlier, Nöe, on the one hand, and Hutto and Myin, on the other, seem to hold opposing views. In this paper, we will argue that both are misguided and leave no room for "enactivism."

Know-How

Nöe claims that perception is essentially sensorimotor know-how. He explains,

> *Consider an example of Evans's. When you hear a sound as being on the left, you don't need to think about which way to turn in order to orient toward the sound. Hearing it as being on the left is bundled, as it were, with the understanding that to turn to the left is to turn toward the sound (that doing so would increase the intensity of the relevant sound). You do need to think about how to maneuver a couch to squeeze it through a small passage. But you do not need, in the same way, to think about how to maneuver your body to squeeze it through the doorway. Just perceiving the doorway as having certain spatial qualities is perceiving it as enabling, requiring, or permitting certain kinds of movement with respect to it. With the sound, and the passage through the door, one is occupied with egocentric, behavioral space. With the couch and the small passage, one is concerned with geometry and absolute space. Only in the latter case, but not the former, would one need to think, calculate, and measure. (2004, pp. 88-89)*

An agent that perceives visually must satisfy two conditions. The first would be that the agent's visual perception should actively exercise his knowledge of sensorimotor laws. Visual perception only occurs "when the organism has mastered what we call the governing laws of sensorimotor contingency" (O'REGAN & NOË, 2001, p. 939). Here, O'Regan and Noë argue that the cognition associated with the exercise of our motor skills is not a form of propositional knowledge (what they call "intellectualism") but practical knowledge (Noë, 2004, p. 11). According to the second condition, there would have to be an object in the environment that triggers the perceiver's sensorimotor responses (Noë, 2005).

However, can we say that know-how is practical knowledge without propositional meaning? As mentioned in the introduction to this article, STANLEY AND WILLIAMSON (2001) present a semantic analysis of "know-how" that undermines such anti-intellectualist beliefs. According to them, "know-how" cannot be reduced to practical knowledge without propositional meaning. Instead, "know-how" depends on various forms of propositional knowledge, i.e., the knowledge that, when, how, where, and why a proposition is true (know-who, know-where, know-when, and know-what). This section will support the authors' conclusions with examples from daily life.

The life of JOÃO CARLOS MARTINS, a famous Brazilian pianist, was marked by a series of unfortunate events that eventually made it impossible for him to pursue a career in classical music. In 1965, Martins was living in New York when he accepted the invitation to join the amateur team Portuguesa Paulista for a practice match in Central Park. He was overjoyed to play for his favorite team, but his joy quickly turned to despair when, during a seemingly innocuous tackle, he suffered a puncture wound to his elbow that severed his ulnar nerve.

The "little accident" resulted in the atrophy of three fingers, leaving him unable to play for an entire year. The recovery process was lengthy and complicated, so Martins could not play until he was 30. However, this was only one of the many obstacles the maestro had to overcome during his career. After a lengthy physical therapy, the pianist returned to the stage, earning positive reviews despite the difficulties. Unfortunately, Martins was again unable to perform due to work-related musculoskeletal disorders.

Despite another challenge, the renowned pianist did not give up his career and adapted to the limitations caused by his problem. He resumed it, performing from 1979 to 1985 and recording 10 works by Bach, completing all of Bach's compositions. In 1995, however, Martins was again dogged by bad luck: During a robbery in Sofia, Bulgaria, an iron bar severely injured his right arm. After surgery, the neural connection between his right arm and the sensorimotor cortex had to be severed, so he could never move it again.

What did the pianist do after that? He recorded the album "Just for the Left Hand." All compositions on this album were composed in honor of PAUL WITTGENSTEIN, the brother of the famous philosopher who had lost the same member in World War II. Martin's idea was to record 8 albums with this theme. However, then a tumor was discovered on his left hand. As a result, he learned from his doctor that he would never play the piano again. They severed the nerve connections between his left hand and his sensorimotor cortex.

At that moment, a pianist died, but a conductor was born. The next day, Martins enrolled in a conducting course. Martins meticulously memorized every note but had difficulty coordinating his finger movements and could not hold the baton or turn the pages of the concert score at the required speed. Nevertheless, Martins undoubtedly became a capable conductor and had the privilege of conducting the music of his favorite composer, J.S. Bach.

The intriguing question at the heart of our debate is this: What would we intuitively say? When Martins had the connections between his sensorimotor cortex and his two hands severed, did he stop "knowing" how to play the piano? If Martins had lost the alleged "governing laws of sensorimotor contingency," would he have stopped knowing how to play the piano? Would it be fair to say that Martins used to know how to play Bach masterfully, but now Martins does not know how to play it because he cannot play it? Has he lost his tactile perceptual knowledge of how to play the piano?

This is nonsense. Despite the countless personal tragedies that have prevented Martins from playing the instrument, he still seems to know exactly how to play the works of Bach, Chopin, Beethoven, and so on. He just cannot put his knowledge into practice. So the question remains: what can Martin still know how to play? The answer is quite intuitive: he still knows how to play because knowing how to play is propositional knowledge (the thesis of Stanley and Williamson), even if he can no longer play.

The first point to consider is this: if Martins no longer knew how to play, his complaint would take the form:

- “Oh, if I still *knew how* to play the piano?”

But that is not his complaint, but rather:

- “Oh, if I could still play the piano?”

If we take these (hypothetical) complaints of Martins seriously, what would we say? That Martins does not know how to play (know-how)! That is nonsense: Martins *cannot* do what he still *knows how* to do.

Suppose neuroscience could restore the severed nerve connections between Martins' sensorimotor cortex and his hands. What would happen then? Would he be able to play the piano? Well, with some training, he would probably return to playing the piano the way he always did. This consideration raises the question: Metaphysically, what constitutes Martin's tactile perception, the common practice of playing the piano (the sensorimotor tactile contingency), or the neural circuitry that connects the sensorimotor cortex to the pianist's hands?

If the enactivist view were correct, the following story would sound plausible. Martins knew how to play the piano, but because of the surgical severing of the nerve connections between his hands and his sensorimotor cortex, Martins no longer knew how to play the piano. However, with the restored nerve connections between his hands and sensorimotor cortex, Martins learned how to play the piano again! We can formulate a simple argument by reductio *ad absurdum*:

1. Martins *knew how* to play the piano before the nerve connections between his sensorimotor cortex and his hands were severed by surgery because of the tumor that had occurred.
2. Enactivist assumption: know-how is a mere form of practical knowledge without cognitive or propositional meaning.
3. When the nerve connections between his sensorimotor cortex and his hands were surgically severed, Martins no longer *knew how* to play the piano.
4. Absurd: Well, after a new surgical intervention reestablished the nerve connections between his sensorimotor cortex and his hands, Martins *knew how* to play the piano again!

This simple consideration shows that sensorimotor contingencies naturally affect tactile perception but are not metaphysically constitutive. What constitutes tactile perceptions are the relevant brain circuits. Many enactivists may consider the hypothesis of restoration of neural connections between the sensorimotor cortex and Martin's hands as a fanciful philosophical argument. To better understand what is at stake, we can look at a similar example: the case of paraplegic Juliano Pinto, who used his exoskeleton to kick a ball at the Maracanã in 2014. Here we can consider all the relevant details.

1. JULIANO PINTO (29) knew how to kick a soccer ball like any adult until he suffered a severe accident that left him a person with paraplegia. The severing of his spine severed the nerve connections between his sensorimotor cortex and his legs.
2. Enactivist assumption: practical knowledge has no propositional meaning.

3. Considering 1 and 2, when Juliano Pinto develops paraplegia, Juliano simply no longer knows how to kick a soccer ball.
4. Well, but using an exoskeleton, Juliano Pinto in the USA kicks off the 2014 World Cup in Maracanã (Brazil). Behold, Juliano Pinto knows how to kick a soccer ball again!
5. Absurd: how did Juliano Pinto, once paraplegic with only an exoskeleton, learn how to kick a ball again?

Finally, let us assume the following counterfactual situation. Martins would not have been affected by any of the personal tragedies mentioned above (which occurred). He would have continued to play Bach, Chopin, and Beethoven as usual. With advanced age, however, Martins began to suffer from Alzheimer's disease. Alzheimer's disease does not primarily affect the sensorimotor cortex but rather the hippocampus, which controls memory, and the cerebral cortex, which is essential for language and thought, memory, recognition of sensory stimuli, and abstract thinking.

Now let us assume that at the onset of his dementia (Alzheimer's), Martins sat down at the piano and began one of the countless Bach fugues he knew by heart. The most plausible scenario would be the following: Already demented and stopped the performance after the first few bars, but why? A more plausible answer: because he would not remember the rest of the fugue.

The question now arises: Can Martins, who has Alzheimer's disease, still play the piano? Does he know how to play Bach's fugues? The intuitive answer is: No, he does not know anymore! Because of the loss of working memory and the deterioration of his prefrontal cortex, he no longer knows what he used to know by heart. However, what is he missing now? Answer: propositional knowledge: He no longer knows what to do with his hands to execute the fugue (a proposition). And thus, we have a further reduction of the absurdity of the behaviorist thesis that know-how is merely practical knowledge without any propositional component:

6. Martins *knew how* to play the piano by heart before suffering from Alzheimer's.
7. Enactivist assumption: know-how is a mere form of practical knowledge without cognitive or propositional meaning.
8. When Martins has Alzheimer's disease, at least initially, his sensorimotor cortex remains intact (empirical fact).
9. Absurd: suffering from Alzheimer's disease but still having an intact sensorimotor cortex, Martins still knows how to play the piano.

The moral of the story is this: one cannot reduce know-how to practical knowledge without propositional meaning. Therefore, one can neither reduce tactile perception to sensorimotor contingencies (without propositional meaning). Since enactivism rests crucially on this general assumption, enactivism must be false.

The Brain and the Body

According to enactivism in its various forms, perception is essentially an embodied activity of an organism. Perception/cognition and the body should have an essential metaphysical relationship. The basic metaphysical assumption here is that we are essentially our living bodies. This assumption of ours finds support in SHAUN

GALLAGHER'S statement that it is up to the (own) body to give form to the mind (the body shapes the mind, see GALLAGHER, 2006) and to organize the perceptual field.

This section will argue the opposing thesis: The relationship between perception/cognition and embodied activity is metaphysically contingent. If two or more biological bodies are structurally similar, or even far avatars in space, they may be linked to the same sensory experience. We argue that the brain must perceptually and cognitively shape the biological or physical body (*Körper*) to be a living body. Only a subliminal image (called a body schema) of the physical body can give rise to the perceptual and cognitive living body. My brain's image of a body as being mine rules the perceptual and cognitive realms, not my biological body (*Körper*). Therefore, it is not the body's movement that allows perception but the opposite: the representations of the body as a living body enable embodied actions.

We would like to start this section by listing experiments conducted by the Brazilian neuroscientist MIGUEL NICOLELIS. First, researchers have developed sensors to detect these activities in rats, decode them, and transmit them to other rats, where they are decoded and understood. Nicolelis and colleagues describe the experiment as follows:

> *A brain-brain interface (BTBI) allowed a real-time transfer of meaningful behavioral sensorimotor information between the brains of two rats. In this BTBI, a "coder" rat performed sensorimotor tasks that required it to select two options of tactile or visual stimuli. While the coder mouse performed the task, samples of its cortical activity were transmitted to corresponding cortical areas of a "decoder" mouse using intracortical microsimulation (ICMS). The scrambler rat learned to make similar behavioral selections, guided only by information provided by the scrambler rat's brain. These results demonstrated that a complex system was formed by the coupling of animal brains, suggesting that BTBIs may allow dyads or networks of animal brains to exchange, process, and store information and therefore serve as a basis for studies of new types of interaction for biological computing devices. (PAIS-VIEIRA et al., 2013, p. 1)* [2]

One mouse received mental commands from another (which was in a different room) and operated a lever. Researchers rewarded the coding rat if the other performed the task correctly. This dual incentive led to cooperation between the two rats. When the second mouse made a mistake, the first mouse tried to reformulate the command by being more attentive and giving more precise commands. Of course, none of this happens at a reflexive, conceptual, or propositional level.

The question now is this: What can we learn from this experiment? First, since two or more bodies are in different spaces and use the same neural network, the relationship between each perception and each body is not essential but metaphysically contingent. It does not matter which body ultimately performs the task. What matters is what the enactivist wants to deny: the intracranial neural network (Brainet). Mutatis mutandis, the relationship between a particular sensorimotor cortex and the action performed, is also metaphysically contingent. What matters at the brain-brain interface is the sensorimotor information transmitted from one cortex to another.

This case allows us to formulate two brief arguments against enactivism.

1. First enactivist thesis: "perceiving is not an *activity in the brain*, but a kind of skillful activity on the part of the *animal as*

a whole" (NÖE, 2004, p. 2, emphasis added).

2. Now, according to the brain-brain interface (BTBI): a rat sees the lever without moving it with its own body and without the lever being in its space but moves it simultaneously through the body of a third rat.
3. Thus, first, perceiving is instead an activity in the brain (neuronal network), and the action performed is contingent on perception.

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4. Conclusion: enactivism is false.
5. Second enactivist thesis: "The activity of the organism—engaging with features of its environments in specific ways—is sufficient for the most basic types of cognition. *Such activity does not depend on individuals retrieving informational content from the world."* (HUTTO and MYIN, pp. 4-5, emphasis added).
6. According to the BIBT, the mouse that activates the lever only does so because it "recovers sensory-motor informational content" from the first mouse.

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7. Conclusion: enactivism is false.

One possible reply in support of enactivism is that BIBT also relies on the crucial concept of cognitive embodiment, as both rats use their bodies differently to perform tasks. Additionally, BIBT seems to validate the idea of the extended mind, which is a source of inspiration for enactivism, as Chalmers and Clark claim (2000).

However, this answer misses the point. First, no one denies that **a** body is necessary and that the mind extends into the world. Even a Cartesian dualist, let alone a cognitivist, does not believe that a disembodied entity is capable of perceiving and cognizing. What is metaphysically essential about cognitive activity is not this body or limb that performs the activity but the neural network that transmits information from one body to another. Part of our extended mind is our computer. If we continue writing the essay after downloading it from the cloud, it means that this or that machine is unnecessary for our task. Similarly, if we lose a limb but a mechanical replacement can function with our intact sensorimotor cortex, it proves that this specific limb is not essential - as long as the replacement has a comparable functional structure.

This case leads to Block's central objection: enactivists of all kinds fall prey to a fundamental confusion: they confuse constitutive metaphysical relations with causal contingent relations. The performance of a perceptual activity is causally dependent on a body. However, no particular body constitutes the activity since the second body can replace the first without affecting the cognitive activity.

The second experiment is the one Nicolelis did with a neural network of primates. They learned to use the interface for much more complex tasks. Two or more primates began controlling artifacts via an avatar. In the words of Nicolelis and colleagues:

> *Traditionally, brain-machine interfaces (BMI) extract motor commands from a single brain to control the*

> *movements of artificial devices. Here, we present a Brainet that uses the large-scale brain activity (VLSBA) of two (B2) or three (B3) non-human primates to engage in common motor behavior. A B2 generated 2D movements of an avatar arm, where each monkey contributed equally to the X and Y coordinates or one monkey fully controlled the X coordinate and the other controlled the Y coordinate. A B3 produced arm movements in 3D space, while each monkey generated movements in 2D subspaces (XY, YZ, or XZ). With long-term training, we observed an increase in the coordination of behavior, an increase in correlations in neuronal activity between different brains and changes in the neuronal representation of the motor plane. Overall, Brainet's performance improved due to the collective behavior of the monkeys. These results suggest that primate brains can be integrated into a Brainet, which self-adapts to achieve a common motor goal. (RAMAKRISHNAN, 2015, p.1)*

Brainets are synchronizations of neural activity between different brains. After controlling the avatar with their brains, the primates could process haptic feedback. For example, one of the monkeys could tactilely perceive an object and immediately relay this information to its partner on another continent. The first conclusion from this experiment is the same as the previous one: the same body is not necessary for tactile experience: Bodies can vary, as well as the spaces they occupy in the same experience. The relationship between any perception and the body itself is metaphysically contingent. What we need is what the enactivist wants to deny: the existence of a neural network instantiated in an indefinite series of bodies in different spaces.

However, the second conclusion seems to us even more critical. The experiments show that it is possible to add "artificial devices" to the brain and represent them as organic parts of the body. It is relatively trivial to see that artificial devices extend the mind beyond the limits of the cortex. However, the most interesting thing seems to be the following: From the experiment of Nicolelis and colleagues, we can conclude that the brain extends beyond the limits set by the biological body. What is or is not part of my living body depends essentially on the configurations of my brain. We can add artificial devices by representing them as members of our bodies, just as we add multiple accessories to our computers via Bluetooth. Primates "embed" devices as parts of their bodies, just as we add wireless headphones to our computers by simply adjusting the "system settings."

One might object that we would be defending CHALMERS AND CLARK'S (2000) extended brain thesis if we claim that primate brains "incorporate" devices as parts of their bodies. However, even if we acknowledge that Chalmers and Clark's extended mind was one of the sources of inspiration for enactivism, we should not confuse them. It is one thing to claim that my brain incorporates various artifacts by representing them as my living body parts; it is quite another to claim that perception and cognition are not a kind of representation but a kind of action. Our controversy does not revolve around the (now more than trivial) thesis of the extended mind or brain. The thesis we strongly reject is metaphysically much more substantial. It holds that the so-called sensorimotor contingencies metaphysically constitute cognition and perception.

However, the most crucial experiment of Nicolelis and colleagues puts a damper on all forms of enactivism. The experiment of Nicolelis and colleagues supports the thesis that the representation of the body in the brain itself, the so-

called body schema, precedes and constitutes the tactile perception of objects:

> ***The cerebral representation of the body, called body schema, is susceptible to plasticity.*** *For example, subjects who experience a rubber hand illusion develop a sense of ownership of a dummy hand when they see it being touched. At the same time, tactile stimuli are simultaneously applied to their hand. Here, the cortical basis of such a modality was investigated through simultaneous recordings of primary (i.e., S1) and motor (i.e., M1) cortical neuronal ensembles. At the same time, two monkeys watched an avatar arm being touched by a virtual ball. After a period in which the virtual touches occurred synchronously with the physical brushing of the monkeys' arms, the neurons in S1 and M1 began to respond to the virtual touches applied alone. Responses to virtual touch occurred 50 to 70 mms later than physical touch, consistent with the involvement of polysynaptic pathways linking the visual cortex to S1 and M1. We propose that S1 and M1 contribute to the illusion of the rubber hand and that, taking advantage of the plasticity of these areas, patients can assimilate neuroprosthetic limbs as parts of their body schema. (SHOKUR et al., 2013, p. 1, our emphasis)*

Gallagher would probably respond here that neuroscience confuses "body image" with "body schema": "The concept of body image helps to answer the question about the appearance of the body in the perceptual field; in contrast, the concept of body schema helps answer the question about how the body shapes the perceptual field" (2006, p. 18). The idea behind this is that the body schema is not a representation of the body itself (the body image) but something that motor skills and habits essentially make up.

However, Gallagher's motor conception of the body schema is inconsistent with the data from the experiment of Nicolelis and colleagues. There is no evidence in the experiments of fine motor skills! What the experiment signals is an overlap between the visual information of a rubber hand and the tactile information of the hand itself, leading the subject to mistakenly perceive the rubber hand as part of his or her own body: "Subjects experience the illusion of a rubber hand and develop a sense of belonging to a hand puppet when they see it being touched, while at the same time tactile stimuli are applied to their own hand" (SHOKUR et al., 2013, p. 1).

It is not some motor habit that constitutes the perceptual field but nonconceptual representations of a body from the intersection of information from different sources. That is, the body that is significant for perception is not a "Körper" but a "Leib" (living body). However, the crucial point that the enactivists miss is this. The nonconceptual representation of a biological body or surrogates (such as avatars and mechanical limbs that metaphysically constitute this living body) takes the form of a schematic body generated by the brain in a subpersonal and subliminal way. In short, it is not the body that shapes the mind but the brain that shapes the living body.

Known pathological cases point to the same anti-enactivist conclusion, such as phantom limb pain. Almost all people who have had a limb amputated or a nerve removed report phantom limb pain, but few report persistent phantom limb pain. The first question for the enactivist is: how can we understand so-called phantom pain without assuming representational contents? How could an embodied interaction explain how and why I feel a limb that does not exist and, worse, hurts? If the function of experience is to bring us into contact with the world, as Nöe says, where would the contact be in the case

of phantom pain?

Many people with phantom limb pain report excruciating pain, usually not relieved by medication or implanted devices. The most plausible interpretation is that the amputated limb is no longer biologically present. However, the brain continues to perceive the amputated limb, i.e., it represents it as part of the schema or body representation. Affected individuals report feeling pain in the missing limb because that limb is "stuck" in a sense. The most ingenious therapy is simple and free. VILAYANUR S. RAMACHANDRAN proposed it: the person performs movements with the remaining limb in front of a mirror, which is projected in reverse onto the mirror (see RAMACHANDRAN AND RAMACHANDRAN, 1996). In a recent paper, JACK TSAO and colleagues describe one of the best attempts to determine the actual value of mirror therapy for phantom limb pain. The researchers randomly selected 22 subjects with lower limb amputations and phantom limb pain and divided them into three groups:

1. **Movements in the mirror:** patients viewed the reflection of their intact feet in a mirror while moving both feet simultaneously (Obviously, amputees cannot move the missing foot, but they can move the phantom foot).
2. **Concealed mirror movements:** Patients performed the same movements, but the mirror was covered, so they could not see a moving limb.
3. **Imaginary movements:** Subjects were asked to imagine moving the phantom foot with their eyes closed.

All patients performed 15 minutes of their assigned therapy daily and noted the number, duration, and intensity of pain episodes. After four weeks, there were two significant findings. First, pain decreased significantly in all six patients who performed the mirror movements, averaging from 30/100 to about 5/100 on a 100-point scale. Second, the pain got worse, not better, in three of six patients in the covert mirror movements group and four of six patients in the imaginary movements group. The most plausible conclusion from these experiments is that those mirror movements reduce phantom pain. Why was the treatment successful? There is no clear answer to that since we do not know precisely how the brain works. However, one thing is sure, which is vital for the discussion in this essay. One way or another, the brain represented the phantom limb differently through the mirror.

The enactivist might reply that the arm movements reflected in the mirror reconfigure the body image. Well, this answer does not seem to make sense to us for two reasons. First, long before the mirror reflected the limb's movement, there was a nonconceptual illusory representation of the phantom limb as a living body limp. No body movement caused such a representation in the subject. Second, the issue here is not the movement of the limb but the overlap of visual representations with proprioceptive representations, as in the previous case. Again, it is not the physical body (*Körper*) that dominates, but the living body (*Leib*), i.e., what the brain represents as its body.

There are countless other examples, but we will limit ourselves to one: cases of eating disorders. Every anorexic looks at herself in the mirror as "obese," even if she looks like a survivor of a Nazi concentration camp! The moral of the story: it is not the biological, physical body (*Körper*) that constitutes the perception of worldly objects and the states of others, not even self-perception, but on the contrary, it is the perception of the biological body as one's own living body (*Leib*) that makes possible the perception of objects and mental states of others. [3]

The Whereabouts of Consciousness

In this final section, we will attempt to dispose of the last putative dogma of enactivism, which we may call "enactivist phenomenal externalism." However, it is unclear whether and to what extent enactivists support this claim. For example, while they claim that the constitutive laws of experience depend on interactions with the world or that neural activity alone cannot constitute phenomenality, Hutto and Myin are ambiguous about this (the property title of an entire section of their book shows this: "Going Wide While Staying In" (2013, p. 158). On the one hand, they seem to distance themselves from the thesis that phenomenology has a broad supervenience base: "To understand phenomenality (...), requires understanding it as part and parcel of world-involving sentient activity. However, doing so doesn't logically necessitate the view that phenomenality itself is extensive." (HUTTO and MYIN, 2013, p.154). On the other hand, they show sympathy for what they call the "argument from shared phenomenality": "Even if the supervenience base of phenomenality is always brain-bound- it does not follow that the laws of phenomenology are always and everywhere, narrow" (2013, p. 163).

Nöe's position is even more obscure. He seems closer to an activist phenomenal externalism when he says, "The phenomenal character is an aspect of this activity" (Nöe, 2009, p. 9). Phenomenal experience depends heavily on temporally extended, interactive worldly actions. In his own words, "experience is not caused by and realized in the brain, although it depends causally on the brain. Sensory experience is realized in the active life of the skillful animal" (Noë, 2004, p. 227). However, his statements do not seem clear enough to say whether or not the phenomenal character of experience for Noë rests on a broad supervenience basis.

Enactivists seem to assume that the phenomenality of experience does not depend on neural patterns alone. Sensorimotor activities/contingencies in the actor's interactions with the world also and crucially contribute to the metaphysical constitution of the phenomenality of experience. Nöe suggests that sensorimotor activities constitute neural patterns (a thesis very close to behaviorism). The unanswered question, however, is: how would these behaviors *qua actions* be metaphysically constituted?

Here I see only two possibilities. The first is to claim that actions and interactions with the world are narrowly individuated, i.e., identical brains would act in the same way and perform the same physical movement under the same proximal stimulation, regardless of the distal properties of the environment (assuming the same drives propel them). Brain duplicates would be agent duplicates and, thus, phenomenal duplicates. The second alternative is to assume that actions are broadly individuated, that is, individuated based on the distal causes of the environment with which the actor interacts. In this sense, phenomenality would have a broad supervenience basis, i.e., it would extend beyond the brain: Brain duplicates are not necessarily action duplicates, and thus not necessarily phenomenal duplicates. Identical brains, for example, even if they behave the same under the same proximal stimulation, could behave quite differently, even if the same drives propel them.

I would like to point out the following here. The first reading makes perceptual enactivism a relatively trivial thesis: a form of phenomenal internalism held by most neuroscientists. What is the catch? It does not do justice to Hutto and Myin's slogan, "going wide" (see 2013, p. 158). Indeed, the reading becomes attractive only if we assume with Nöe that

sensorimotor activities are capable of constituting the neural patterns themselves. Here, however, we are one step removed from behaviorism (which would say that phenomenality is only sensorimotor activities). Therefore, the only metaphysically exciting reading is the first: sensorimotor activities are broad. However, this thesis is entirely implausible. And this is what I will show you next!

Enactivists argue that consciousness is not located in the head alone, although brain processes are necessary for the phenomenal character of experience. Nöe (2004, p. 2016) considers this idea a dogma. Enactivists believe that the embodied interaction of the organism with external circumstances partially determines consciousness. Therefore, phenomenal character requires both brain processes and extracranial conditions called "interactive worldly commitments" (HUTTO and MYIN, 2013, p. 158). However, it remains an open question what these extracranial conditions mean and what it means to claim that "consciousness is not in the head."

The opponent here is the phenomenal internalist, for whom consciousness is "internal" to the brain. NÖE provides us with a vivid example:

> *Perhaps the only way - or the only biologically possible way - to produce just the taste sensation you enjoy when you take a sip of wine is to roll the liquid around your tongue. In this case, the liquid, the tongue, and the rolling action would be part of the physical substrate for the experience to occur (NÖE, 2004, p. 227, our translation).*

Here the ambiguity becomes clear. The thesis that consciousness does not supervene locally on the brain (i.e., once one fixes the properties of the brain, one also fixes the phenomenal character of experiences) involves at least two interpretations, one of which is less controversial but still implausible, while the other is counterintuitive. Nöe seems to favor the least controversial interpretation:

> *Regarding the externalism that I am defending here, it does not call into question a series of internalist truths. For example, externalism, the enactivist argument I am advocating here, is compatible with the fact that the only way the world can produce changes in animal consciousness is by producing changes in the brain; that appropriate changes in the brain will produce changes in consciousness even if the environment remains unchanged. Indeed, the externalism I am advocating here is compatible with the fact that neural duplicates will be duplicates with respect to consciousness. (2004, p. 221, our translation)*

Within the ongoing debate surrounding the phenomenal character of experience, enactivist phenomenal externalism has a clear opponent: internal physical state. This idea has been championed by proponents such as NED BLOCK (2019), CL HARDIN (1988), GEOFF LEE (2020), DAVID PAPINEAU (2014), THOMAS POLGER (2004), and HILARY PUTNAM AND HILLA JACOBSON (2014). Neuroscientists widely accept this view, and it is evident in theories such as GIULIO TONONI AND KRISTOF KOCH's (2015) "integrated information theory" of experience. ADAM PAUTZ has defined the concept of the internal physical state as follows:

> ***The conception of the internal physical state.*** *Every experience with a certain phenomenal character is necessarily identical to an "internal" physical property, that is, a certain neural pattern. This property is an intrinsic property of the brain that has nothing to do with anything outside the brain. Differences in the phenomenal character of the experience would boil down to differences in the intrinsic physical properties of the subjects. (2021, p. 60)*

O'REGAN and NÖE argue that the phenomenal character of experience depends on the interaction between the observer and his current environment. This is evident in the coherence of visual experience, which depends on real-time sensory input from the environment. In contrast, dream and hallucination experiences lack this coherence because they are not anchored in the same concrete environment (O'REGAN and NÖE, 2001).

Undoubtedly, it is true that several cases of visual hallucinations differ from actual perceptions. Nevertheless, it would be wrong to apply this assumption across the board. An example is the "Charles Bonnet syndrome" (CBS), prevalent in people who have lost sight, mainly due to age-related diseases such as macular degeneration. Because of spontaneous neural activity in their brains, they often experience vivid and intricate hallucinations that they cannot distinguish from reality. On the CBS website, an older person shared his experience with the following statement:

> *I've had macular degeneration for about six months now, I started seeing these super colorful shapes and figures. Fortunately, my ophthalmologist told me about CBS, so I started to appreciate it. Sometimes I see these vines or plants of such rich green. I love seeing the bold colors, but sometimes they're really, colorful, like when you turn the TV's color control all the way up. (https://www.charlesbonnetsyndrome.org/index.php/cbs-ii/personal-stories).*

Is there a specific action that organisms can perform to distinguish between their hallucinations and real perceptions? The literature does not provide evidence for this. Elderly individuals exhibit the same eye movements during hallucinations and real perceptions, and they zoom in on hallucinated and real plants in their visual field. They recognize the hallucinatory nature of their experiences only after being informed of them by their ophthalmologist. This case alone refutes the enactivist phenomenal externalism. Moreover, there is compelling empirical evidence that the neural activities underlying hallucinations resemble those of actual experiences, further undermining the authors' position (see PENFIELD AND PEROT 1963; FFYTCHE 2013).

Empirical evidence strongly supports the assumption that the conscious aspect of the experience is closely related to the specific neural activity that occurs within. This is the view of ADAM PAUTZ:

> *As in many cases, the structural relationships between experiences (likeness and difference, equal intervals, proportion)* ***do not correspond*** *to the structural relationships between the complex external physical properties our brain is responding to but do correspond to the structural relationships between the internal neural correlates, so it* ***certainly increases the likelihood of the view that our experiences are simply identical to those neural correlates****. (2021, p. 68, translation and emphasis ours)*

If we possessed knowledge of the spatiotemporal activity patterns in each population of neurons responsible for representing colors, along with their systematic "neural code," we could ascertain the conscious character of color experience. Similarly, if we were aware of the activity pattern in a separate population of neurons responsible for spatial features and the systematic "neural code" for a shape or figure, we could establish whether a person is experiencing something angular or round. This is supported by the words of neuroscientist STANISLAS DEHANE, who explains that "The [neural] code contains a complete record of the subject's experience" and that "if we could read this code, we would have full access to a person's inner world" (2014: 143-145).

Pautz's internal state view not only challenges Nöe's enactivist version of phenomenal externalism but also contradicts Hutto and Myin's claim that consciousness is significantly and broadly dependent on the environment:

> *Some enactivists argue that phenomenality has a broad base of supervenience—that it constitutively involves parts of the environment. We call their strongest arguments* ***Essential Involvement Arguments****. They claim that the brain processes necessary for phenomenality occur when, and only when, there is interaction with certain external circumstances. In this view, phenomenality requires the occurrence of certain brain processes and certain extracranial conditions. Extracranial conditions are part of the minimal supervenience basis of phenomenality.* ***Phenomenal experience strongly supervenes or is constituted by interactive, temporally extended, mundane engagements.*** *(2013, p. 158, translation and emphasis added).*

Enactivists' slogan here is: "Going wide!" The activities of an agent interacting with its environment would be metaphysically constitutive of consciousness itself. But here we are back to the initial ambiguity: "Going wide, while staying in" (HUTTO and MYIN 2013, p. 158). When Hutto and Myin speak of a "broad base of supervenience," they also speak of a "minimal base of supervenience" What do they mean? If we follow what the second formulation seems to mean, we are back to Nöe's weak reading: it is only a matter of rejecting the internal state view.

The more attractive and instigating approach would be to adopt a version of phenomenal enactivism that aligns with the phenomenal externalism of naturalistic reductionist representationalists such as FRED DRETSKE (2003) and MICHAEL TYE (1995). For these representationalists, brain duplicates are not necessarily phenomenal duplicates because they are not necessarily representational duplicates. According to the externalist phenomenal belief, only representational duplicates can be phenomenal duplicates. Enactivists, however, differ from Dretske and Tye's phenomenal representational externalism in one critical aspect that is already well known. As Hutto and Myin argue, "we must reject the idea that phenomenal identity is an identity of (broad) content" (Hutto & Myin, 2013, p. 162). Their motto is "going wide, but stay in."

Hutto and Myin, however, adhere to the weaker enactivist version of phenomenal externalism and limit themselves to rejecting the traditional idea of "qualia" and disregarding the classical anti-physicalist arguments as the explanatory gap:

> *Like other enactivists, we reject standard ways of characterizing the "phenomenal" side of phenomenon-physical*

> *identities. [...]* ***In this context - and not to provide a direct solution to the Hard Problem - the activist strategy of "going the distance" once again proves useful.*** *The plausibility of the proposed identities seems entirely different and* ***much less artificial****, if it is assumed that the phenomenal character of experiences must ultimately be understood by appealing to interactions between experimenters and aspects of their environments. This is true, even if in the end it should be discovered that phenomenality is nothing more than neural activity associated with broader organic activities. (2013, pp. 176-177, emphasis added)*

This attitude is also well illustrated by the contribution of Cosmelli and Thompson (2010). For example, they claim that the notion of a disembodied brain in a tank of nutrients in a room performing experiments with phenomenal properties is not credible "because of the necessary presence of non-cerebral metabolic processes." We will not dwell on this point, but it raises the question: Why must we assume that brains in nutrient tanks in a vat cannot exhibit the same metabolic processes as brains in human form when properly nourished and stimulated?

The underlying assumption seems to be that we can disregard "philosophical extravagances" such as Chalmers' hard problem, Levine's explanatory gap problem, or the problem of brains floating in nutrient tanks. Setting aside these extravagances, Hutto and Myin suggest that the enactivist version of phenomenal externalism is the most reasonable thesis. They assume that the embodied interactions between the experimenters and the relevant aspects of their environment determine the phenomenal or conscious character of our sensory experiences.

To begin with, the idea of strong supervenience of consciousness over the agent's embodied interactions with the environment seems counterintuitive. It is difficult to accept that consciousness exists not in our brains but in the more extensive organic activities in our environment. Furthermore, the enactivist version of phenomenal externalism still seems far-fetched and wishful. There is not a single piece of evidence to support the view. Moreover, the original theory of phenomenal externalism was already counterintuitive, and the enactivist version seems to exacerbate this issue.

Be that as it may, how could we now oppose the enactivist? In order to avoid a "petitio principi," we must follow precisely the strategy of "going wide" suggested by Hutto and Myin. Once we have done so, we must assume that the embodied actions performed in the particular environment are as broadly/widely individuated as the supposedly conscious or phenomenal character of the particular sensory experiences that the enactivist believes should form the basis. In other words, we must assume that when performed in environments, these embodied actions are also individuated, invoking various particularities and distal properties.

It is unnecessary and undesirable to resort to extreme examples such as direct neural manipulations of intubated brains or bizarre quantum accidents that somehow replicate the relevant neural activity to challenge the enactivist viewpoint. Moreover, we do not wish to address the traditional issues of the explanatory gap, the metaphysical possibility of zombies or disembodied brains floating in nutrient tanks in space. Our sole purpose is to highlight the implausibility and counterintuitive nature of phenomenal externalism in its enactivist version.

In addition, we need to pinpoint real cases in which phenomenal duplicates are not necessarily duplicates of action. For

example, brain duplicates in the same or different environments but interacting with different particulars and distal properties would not be duplicates of actions. Suppose these brain duplicates interact with qualitatively identical but numerically different particulars and distal properties. In that case, they should exhibit phenomenally different responses to the same close stimulation if enactivist phenomenal externalism is correct. Thus, if phenomenal duplicates are not necessarily duplicates of action, then consciousness is not a form of embodied activity that is inseparable from actors' interactions with the environment.

Suppose I was at a party chatting with colleagues about politics and economics, my favorite topics that only make me uncomfortable. Meanwhile, I drank a glass of wine. But every time I emptied my glass, the hostess, my wife's cousin, had it refilled out of courtesy without my knowledge. It was a big "Alma Viva" The glass was on a table behind me, and I was chatting with colleagues in front of me. As a result, I went into a federal frenzy (I could barely stand up). Worse, I did not understand what had happened. I asked my wife, who informed me that I had drunk no less than ten glasses, although I thought I had drunk only three.

Let us take the strategy of "going wide" seriously. Each time I brought the cup to my mouth, I repeated the same liturgy that Nöe suggested:

> *[P] erhaps the only way—or the only biologically possible way—to pro- duce just the flavor sensation one enjoys when one sips a wine is by rolling a liquid across one's tongue. In that case, the liquid, the tongue, and the rolling action would be part of the physical substrate for the experience's occurrence. (Nöe, 2004, p. 2020)*

I performed typical tongue and cheek movements. Although the movements were identical, the enactivist strategy of "going wide" implies that I performed a different action each time I brought the glass to my mouth since I interacted with different particulars. Suppose enactivism is correct and phenomenal character is an aspect of my embodied activity. In that case, I should be able to recognize the supposed phenomenal difference in my different experiences of drinking wine.

The enactivist version of phenomenal externalism faces a dilemma. On the one hand, the enactivist wishes to argue that only narrowly individuated embodied actions, like the mouth movements in Nöe's ritual, are relevant. If this is the case, there is no reason to advocate for the strategy of "going wide" since particulars do not contribute to phenomenal consciousness. Furthermore, this perspective contradicts the notion of internal physical states and thus falls back on the first of the two readings of enactivism. Given all this, the theory of phenomenal externalism in enactivism seems implausible since the best available evidence suggests that neural patterns rather than extracranial embodied actions determine the phenomenal character of experience is determined. Therefore, it is clear that when embodied actions are broad, there is no necessary metaphysical link between them and possible forms of consciousness.

Let us now consider the case of distal properties. According to experiments by BEVERLY. J. COWART and NANCY RAWSON:

> *Available evidence indicates that several chemical and molecular characteristics (e.g., molecular weight,*

> *molecular mass and shape, polarity, resonance structure, types of bonds, and side groups) can influence the odorous (phenomenal) characteristics of a chemical. However, no systematic correlation has been observed between these (chemical) characteristics and specific (phenomenal) odor qualities. In other words, chemical substances that bear little structural similarity may smell the same, and chemical substances that are almost structurally identical may produce very different experiential qualities. (2001, p. 568, emphasis ours).*

Recent experiments have confirmed this conclusion. In 2019, JAMES D. HOWARD and colleagues used functional magnetic resonance imaging (fMRI) to examine distributed spatiotemporal neural patterns generated by different odors in the "posterior piriform cortex." They discovered that the similarity between neural patterns was more consistent with the perceived similarity of the odor than with its chemical similarity. Therefore, neural similarity seems to be the only factor that allows us to understand phenomenal similarities between odors (see Pautz 2021).

The Carménère grape originated in the renowned Bordeaux region, known for producing some of the world's most expensive and sought-after wines. The grape was an essential ingredient in the blends of these famous wines. However, in 1870, vineyards worldwide were devastated by a destructive phylloxera plague that nearly wiped out the Carménère grape. At the time, Carménère was thought to be extinct. Unknowingly, throughout most of the 20th century, Carménère grapes were harvested and processed unintentionally along with Merlot grapes, which may have accounted for as much as 50% of the total. This resulted in Chilean Merlot having different characteristics than Merlot from other countries. Chilean winemakers believed this grape was a Merlot clone and named it Merlot selection or Merlot Peumal.

In 1994, the French ampelographer JEAN BOURSIQUOT, a researcher at the Montpellier School of Oenology, rediscovered the Carménère grape as a distinct varietal. The question arises: why was Carménère considered extinct? Because Carménère and Merlot grapes on the same terroir were phenomenally indistinguishable. But how to distinguish Carménère from Merlot grapes? Boursiquot was an ampelographer and a viticultural specialist who made a botanical discovery. But Carménère and Merlot grapes also differ chemically: the concentration of anthocyanins, shikimic acid, and the main flavonols in the wine makes it possible to distinguish the grapes. DNA typing is also a valuable tool for verifying their identity. Two DNA markers, VVMD28 and VVMD31, have been identified to distinguish between Carménère and Merlot. The story's moral is the following: Although the distal characteristics of the environment were different, they produced almost identical stimuli.

Suppose we were in 1993, and Oscar, a Chilean winemaker, was tasting a Carménère and then a Merlot from the famous Concha y Toro winery. The temperature of the wines is the same, and Oscar is in the same environment with his body temperature unchanged. Oscar performs the ritual body movements recommended by Nöe with the tongue, cheeks, palate, nose, etc. However, in 1993 Oscar could not taste the difference between a glass of Carménère and another glass of Merlot, as many winemakers still fail to do in "blind tests."

If we were to follow the "going wide" strategy, we would have to assume that Oscar's "embodied actions" are fundamentally different, even though his bodily movements might be identical in all relevant respects. In this situation, if Oscar tastes first the Carménère and then the Merlot, his embodied interactions are different. The grapes have different

concentrations of anthocyanins and shikimic acid, and their DNA differs. Thus, if the enactivist version of phenomenal externalism were correct, there would have to be a conscious difference for Oscar between tasting a Carménère and tasting a Merlot. In other words: When Oscar interacts with different chemical characteristics on the same terroir, he must realize that he is tasting phenomenally different wines.

However, this did not happen until 1994! Although the grapes were chemically different, the close stimuli on Oscar's taste buds were identical in all relevant aspects (which is why the Carménère grape was considered extinct after the plague and probably for 100 years). Question: Can we deny that Oscar tasting the two glasses of different wines is not a phenomenal duplicate of himself?

Conclusion

As we conclude these sections, we are reminded of the fundamental metaphysical question of our nature: what are we? Enactivists have a clear answer to this question. They believe that we are a living body with a brain like any other vital organ. Merleau-Ponty has been unequivocal on this question:

> ***But I am not in front of my body, I am in my body, or rather, I am my body****Neither its variations nor its invariants can therefore be expressly stated. We are not only contemplating the relationships between the segments of our body and the correlations between the visual body and the tactile body:* ***it is we ourselves*** *who hold these arms and legs together, who see and touch them. (1945, p. 175, emphasis added)*

Nöe is also unequivocal in the subtitle of one of his most important books of 2009:

> *The human experience is a dance that unfolds in the world and with others.Y****ou are not your brain.*** *We are not locked in the prison of our own ideas and sensations. The phenomenon of consciousness, like that of life itself, is a dynamic process that involves the world. We are already at home in the environment.* ***We are out of our brains.*** *(2009, p. XIII, emphasis added)*

If they are correct, we could perform brain transplants soon, just as we perform liver, kidney, and even heart transplants, without changing our numerical identity as persons.

Let us assume that everything we assert here is correct. The conclusions are those promised in the introduction. 1- Know-how is not a form of practical knowledge without propositional meaning; 2- the relation between any perception and one's body is metaphysically contingent; 3- it is the brain's job to configure or shape a physical body (*Körper*) into a living body (*Leib*) and not vice versa; 4-phenomenal enactivist externalism is implausible in its mild form and completely counterintuitive in its most radical form, but mostly false: phenomenal duplicates are not necessarily agency duplicates; 5- we are our brain and not a body that has a brain among other organs.

Footnotes

[1] This distinction was introduced in the 1920s by the anthropologist HELMUTH PLESSNER in collaboration with the Dutch behavioral psychologist FREDERICK J. BUYTENDIJK (see CEM STRUYKER BOUDIER 1993). Merleau-Ponty adopts this distinction as his own (see MERLEUAU-PONTY, 1945, p. 327).

[2] A group led by Miguel Nicolelis carried out these surveys were carried out by, but not all publications have Nicolelis as the first author. For a complete list of publications, cf. https://www.nicolelislab.net/?page_id=91

[3] One may now wonder whether the unequivocal assertion that the brain shapes the body aligns with everything we know about evolution. For example, Leroi-Gourhan (1964) claims that bipedal posture allowed the evolution of the modern cerebro-structural configuration. Indeed, from an evolutionary perspective, Homo sapiens would not have been able to have its brain, etc., without its unique bipedal posture. In this sense, the brain has no metaphysical privileges over the body's limbs or vice versa. However, we are speaking here of perceptual and cognitive abilities. We reject the enactivists' claim that embodied actions metaphysically constitute sensory experience since differences in sensory experience do not necessarily lead to differences in embodied actions and interactions with the environment. Our claim should therefore be understood as the thesis that the brain perceptually and cognitively shapes the body. For this remark, I am indebted to Joel Osea Baldo Gentile (reviewer).

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