THE LIVED AND THE OBJECTIVE

Body, Space and Interdisciplinary Encounters in Embodied and Enactive Cognition

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Abstract: At first glance, it may seem that the radical attention paid to the content of lived experience, as promoted by phenomenologists, has no readily justifiable place alongside scientific modes of inquiry. However, despite this apparent tension, so-called embodied and enactive approaches to cognition have freely recruited findings from phenomenology, psychiatry and the neurosciences into singular, interdisciplinary accounts for the purpose of addressing a myriad of complex research questions. In this article, I aim to focus on how, through the use of particular case examples, such disciplines might indeed mutually inform one another by jointly incorporating both the "lived" and "objective" dimensions of their subject matter. To accomplish this, I briefly review how the notion of the lived body has migrated from phenomenology to inform accounts of embodiment in both the neurosciences and clinical psychology. Thereafter, I analyse how emerging literature on spatial cognition and the distinction between lived and objective space and its clinical manifestations can serve as a parallel to, and complement, the distinction between the lived and objective body that remains central to embodied-enactive approaches. Finally, I argue that phenomenological approaches to both psychopathology and experimental neuroscience are well-suited to describing the kinds of experiences inherent to certain clinical conditions and patterns of neurophysiological activity, especially where alternative conceptual frameworks may prove less conceptually compatible in an embodied and/or enactive context.

Keywords: Enactivism, Embodiment, Peripersonal space, Clinical phenomenology, Neurophenomenology.

1. Introduction

The embodied-enactive approach to cognition is a contemporary branch of cognitive science and is perhaps one of the most self-consciously interdisciplinary strategies currently available for studying the mind. An embodied-enactive approach typically combines philosophical argumentation with empirical literature to produce a model of cognition that highlights how the mind might be fundamentally constituted by its embodiment and by its capacity to actively engage the world as an embodied being. Arguably, an embodied-enactive approach is somewhat methodologically

unique insofar as it frequently exploits resources from both the sciences and the humanities to stake its claims.

The terms "embodiment" and "enactivism" comprise two of the "*Es"* that make up the field of 4E cognitive science, the contemporary locus for many research initiatives in which phenomenological philosophy and empirical science converge in the pursuit of addressing a myriad of questions relating to mind and consciousness.[1] It appears that in several prominent embodied-enactive approaches to such questions, both scientists and philosophers have combined phenomenological and empirical resources to facilitate new ways of conceiving of cognition. However, the extent to which otherwise discrete modes of analysis can co-operate on circumscribed research topics is still hotly debated.

On the one hand, an embodied-enactive approach has clear antecedents in the phenomenological tradition while simultaneously relying heavily on empirical literature from psychology, neuroscience and medicine.

Indeed, in the *Oxford Handbook to 4E Cognition*, the editors write:

> There is a general agreement that a priori definitions or models of cognition are not helpful, and that we need to conduct experiments and consult the empirical literature. 4E approaches are part of cognitive science and as such offer models that need be tested using a variety of methods drawn from different disciplines.[2]

How this "variety of methods" might productively communicate with one another is the focus of this paper. To explore this possibility, I will focus on how these discrete methodologies can productively intersect upon an embodied-enactive account of cognition.

As Di Paolo and Thompson indicate, embodiment and enactivism can encompass a wide range of approaches, from the more conservative to the more radical.[3] My intention here is to sidestep such debates and instead highlight specific areas of convergence whereby phenomenology and empirical science can be placed into a reciprocally informative relationship insofar as highlighting the embodied and enactive elements of cognition is required. I focus on embodied-enactive approaches to cognitive

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[1] I will delimit my discussion to *embodied* and *enactive* approaches to cognition and not to the *extended* and *embedded* components of 4E cognitive science. I hyphenate "embodied-enactivism" to highlight that, in the examples discussed below, there is a hypothesised co-extension between an embodied and an *enactive* embodied mind insofar as the lived body is not a static entity but is defined by its motility.

[2] Albert NEWEN, Leon DE BRUIN, Shaun GALLAGHER (eds.), *The Oxford handbook of 4E cognition*, Oxford University Press, Oxford 2018, p. 9.

[3] Ezequiel DI PAOLO, Evan THOMPSON, *The enactive approach*, in Lawrence SHAPIRO, *The Routledge handbook of embodied cognition*, Routledge, London 2017, pp. 68-78.

science to delimit my analysis to research initiatives that are considered neither phenomenology nor neuroscience "proper" yet must find a viable pathway for including both. I argue that what frequently underpins such approaches is the necessity of combining both the objective and subjective (or better: "lived") dimensions to a "cognitive domain" under investigation (by this I intend embodiment, action, temporality, spatiality, intersubjectivity, etc.) into a unified account.

To investigate how this interdisciplinary synthesis might function practically, I will examine some key areas of conceptual and methodological convergence which incorporate the "lived" and "objective" dimensions of two cognitive domains. Firstly, I will choose what is perhaps the most straightforward locus for such an analysis, that of the body itself. Thereafter, I will apply a similar analysis to the comparatively understudied domain of spatiality, highlighting its "lived" – that is, embodied and enactive - dimensions. These analyses will springboard into a final analysis of how incorporating the "lived" dimensions to cognitive domains might be informative for psychiatry and experimental neuroscience generally, highlighting how such disciplines can co-inform one another in the shape of interdisciplinary research initiatives.

2. The Lived Body

The distinction between the lived (*Leib*) and the objective body (*Körper*) was first posited by Husserl in his unpublished manuscripts, published in English as *Ideas II*.[4] Thereafter, Maurice Merleau-Ponty, one of the first scholars to have read these manuscripts, subsequently developed heavily upon the notion of the lived body in his *Phenomenology of Perception* (1945/2012).[5] This distinction might be described as follows. By applying an objective analysis to the body, we discover aspects of the body which are only discoverable through such a lens, i.e., the chemical composition of bone marrow, the function of the liver in blood regulation or simply the body's weight, height or location. Conversely, however, in alternative research contexts, we may need to investigate, for instance, how the human being actively experiences their embodiment, how this body is situated in socio-cultural contexts or how the regular sense of embodiment breaks down in clinical disorders.

[4] Edmund HUSSERL, *Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie. Zweites Buch: Phänomenologische Untersuchungen zur Konstitution,* tr. R. Rojcewicz R. and A. Schuwer, *Ideas pertaining to a pure phenomenology and to a phenomenological philosophy. Second Book: Studies in the phenomenology of constitution*, Springer Science & Business Media, Berlin 1989.

[5] Maurice MERLEAU-PONTY, *Phénoménologie de la perception*, Gallimard, Paris 1945, tr. Donald. A. Landes, *Phenomenology of perception*, Routledge, New York 2012.

In such cases, we are investigating what phenomenologists term the *lived body*, and they argue that its intricacies are not fully articulatable with the tools proper to objective examination. As a "lived body", I exist as an embodied agent in a world that appears aligned with my body so that I experience the world *through my body* but do not experience *my body specifically* as just one more objectively present thing existing among other things. Alternatively, while the objective body can become the object of empirical inquiry as discussed above, it can also simply become an object of one's thought; at any moment, I can focus on my body-as-object too, if, say, I measure the circumference of my chest for a clothes fitting. With the lived body, however, the body itself does not feature as an intentional-object of cognition. In fact, if I am inhabited by any intentional-directedness *qua* lived body, it is directed towards worldly tasks, projects and dealings that I engage *as* an embodied being-in-the-world.

Apparently, this phenomenological distinction has also proven informative for researchers investigating embodiment outside of phenomenology proper. Perhaps the first example we have of the lived body informing the neurosciences is Merleau-Ponty's (1945/2012) analysis of the neuropsychological case study of patient Schneider conducted by Goldstein and Gelb,[67] a WW1 veteran with a shrapnel-induced brain lesion. Here, Merleau-Ponty's key contribution was to apply a phenomenological lens to the Schneider case in order to shed light on perplexing aspects of his symptomatology. Merleau-Ponty argued that what he termed "varieties of consciousness" (i.e., phenomenological distinctions), allegedly underdeveloped in traditional psychology's interpretive toolbox, could serve as ciphers for otherwise confusing aspects of Schneider's post-injury comportment. These "varieties of consciousness" augment the theoretical interpretations necessary for understanding double dissociations, whereby the patient appears able to perform one action perfectly but cannot perform a seemingly slight modification of the same action.

Because of the counter-intuitive nature of double dissociations, explanations reliant on common-sense evaluations often prove unsatisfactory, and, as such, neuropsychology is heavily reliant on theory-heavy interpretations according to a conceptual framework.[8] For our purposes here, one salient double dissociation that relates to Schneider's inability to simply touch or point to any part of his body on

[6] Kurt GOLDSTEIN, Adhémar GELB, *Psychologische Analysen hirnpathologischer Fälle auf Grund von Untersuchungen Hirnverletzter*, in "Zeitschrift für die gesamte Neurologie und Psychiatrie", 41, 1, 1918, pp. 1-142.
[7] Kurt GOLDSTEIN, *Über die Abhängigkeit der Bewegungen von optischen Vorgängen*, in "European Neurology", 54, 1, 1923, pp. 141-153.
[8] John MARSHALL, *Neuropsychology: past, present, and future*, in Jennifer GURD, John C. MARSHALL, and Udo KISCHKA, *The Handbook of Clinical Neuropsychology*, Oxford University Press, Oxford 2010.

command, while still retaining an ability to touch/grasp that very same body part *if* completing a goal-directed action. For example, Schneider *could not* place a finger on his forearm when asked to touch it, but he *could* brush a fly away with his finger if one landed on his forearm. This is a textbook example of a double disassociation ("patient can do *X* but not *Y*") while its interpretation is based upon the premise that discovering some hidden factor should render the two actions distinct in some capacity.

The factor that Merleau-Ponty brings to light is precisely that of the lived/objective body distinction, re-purposed to clarify Goldstein and Gelb's own distinction of concrete vs abstract movement. The concrete action is related to the lived body and «takes place wholly in the order of the phenomenal world, it does not pass through the objective world»,[9] whereby Schneider «is [still] his body and his body is a power for a certain world».[10] By contrast, verbal instructions given to Schneider «no longer speak to him»[11] because he «must invert the relation between my body and the surroundings»,[12] yet he is unable to.

Merleau-Ponty therefore operationalises the phenomenological distinction between the lived and objective body to showcase how, in the "concrete" context, Schneider engages the world via the lived body (e.g., when performing a task) whereas in the "abstract" context he engages his own body as an objectively present thing (touching/pointing to his body without context). In the former, the lived body is the salient factor because he *engages the world as* an embodied being, whereas in the latter he (unsuccessfully) intends the objective body as an explicit intentional-object. The distinction between the lived and objective body thus acquired new utility in explaining an otherwise confounding symptom: the patient engaged the world via the lived body when successfully completing a normal action that constituted his pre-injury repertoire. By contrast, upon having to objectify his body (and locate it in objective space to point to it), the deficit emerged, and he failed to complete the action.

In this instance, we observe a phenomenological insight migrating from phenomenology to neuropsychology by way of Merleau-Ponty's phenomenological interpretation of a neuropsychological case study. Subsequently, this phenomenological insight developed by Husserl and Merleau-Ponty did not remain confined solely to phenomenology itself and has found currency in mainstream psychology. Gallagher clarified the distinction between the lived/objective body into the cognitive sciences by retaining "body schema" for the former and adding "body

[9] MERLEAU-PONTY, *Phenomenology of perception,* p. 136/108.
[10] *Ibidem,* p. 137/109
[11] *Ibidem*, p. 141/113
[12] *Ibidem,* p. 143/115

image" to denote the latter.[13] Recent reviews of embodiment in the neurosciences have retained and expanded upon this distinction. For instance, both de Vignemont[14] and Longo[15] include and expand upon both body image and body schema in their overviews of embodiment in neuropsychological journals.

In cognitive neuroscience, Berthoz has incorporated Husserl's phenomenology of time and Merleau-Ponty's account of the lived body into a cognitive neuroscientific model of bodily movement.[16] Chaminade, Meltzoff & Decety operationalised phenomenological accounts of embodiment in a fMRI neuroimaging study.[17] While the neuropsychologist Johnathon Cole urges caution toward philosophers who wish to draw upon neuropsychology to support their arguments,[18] he nonetheless claims that phenomenology is conducive to the field of neuropsychology. Indeed, in Gallagher and Cole, the distinction between the lived and objective body is retained and applied to another lesion patient,[19] IW, and Merleau-Ponty's approach to the body has similarly found practical application in nursing science with hemi-spatial neglect patients.[20]

From this, it seems justifiable to claim that the notion of the lived body is of demonstrable utility for the neurosciences and clinical psychology whereby, despite the empirical and objective foundations of such disciplines, investigating the objective body alone might prove insufficient for all types of research question. The lived/objective distinction proved valuable in contextualising the double dissociation exhibited by patient Schneider and subsequent patients and was conceptually integrated into several neuroscientific and clinical paradigms.

On a more general plane, we can see that revealing the "lived" dimension to a particular cognitive domain - the first-person, pre-reflective, enactive and world-directed aspects of embodiment – is entirely compatible with otherwise empirical investigations. Crucial to this contribution was the emphasis that the body is not just

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[13] Shaun GALLAGHER, *Body image and body schema: A conceptual clarification*, "The Journal of mind and behavior", 1986, pp. 541-554.
[14] Frédérique DE VIGNEMONT, *Body schema and body image—Pros and cons*, in "Neuropsychologia", 48, 3, 2010, pp. 669-680.
[15] Matthew R. LONGO, *Types of body representation*, in "Foundations of Embodied Cognition", 1, 2016, pp. 117-134.
[16] Alain BERTHOZ, *The brain's sense of movement*, Harvard University Press, Cambridge 2000.
[17] Thierry CHAMINADE, Andrew N. MELTZOFF, Jean DECETY, *An fMRI study of imitation: action representation and body schema*, "Neuropsychologia", 43, 1, 2005, pp. 115-127.
[18] Jonathan COLE, *Phenomenology, neuroscience and impairment*, in "Abstracta", 4, 3, 2008, pp. 20-33.
[19] Shaun GALLAGHER, Jonathan COLE, *Body image and body schema in a deafferented subject*, in "The journal of mind and behavior", 1995, 369-389.
[20] Marianne E. KLINKE, Björn THORSTEINSSON, Helga JÓNSDÓTTIR, *Advancing phenomenological research: Applications of "body schema," "body image," and "affordances" in neglect*, in "Qualitative health research", 24, 6, 2014, pp. 824-836.

another object of cognition but co-constitutive of cognition itself, and that this co-constitutive element is shaped by the body's active involvement with the world. Such a distinction has been powerfully influential on contemporary instantiations of embodied cognition.

Hereafter, I will consider another conceptually complementary lived/objective distinction that is currently less developed than that of the lived/objective body, but which may prove equally fertile for highlighting the importance of including both dimensions when pursuing an embodied-enactive approach in interdisciplinary research contexts.

3. Bodily Space

We saw how the distinction between the lived and objective body as provided by phenomenologists has informed the neurosciences and clinical psychology, disciplines which, taken together, frequently comprise the terrain of embodied-enactive approaches to cognition. We should now turn our attention to an emerging, complementary, yet comparatively understudied lived/objective distinction, that between objective and lived *space*. Like the lived body, I argue that fleshing out a notion of lived space requires interdisciplinary collaboration. Moreover, lived space and the lived body are not even necessarily discrete phenomena and are easily grouped together within a single discussion.

Whenever I grasp a tool, navigate around a pothole, or scale a wall, my lived body is engaging its spatial surroundings in a context-driven, goal-directed manner, taking the body as its primary spatial anchorage point through which my surroundings are made intelligible to me. My body continually engages its surrounding space to accomplish tasks and even incorporates near-by objects (like a broom or cane) located in near-space into my bodily (lived) space, insofar as these objects now constitute and expand my bodily power for influencing and acting within the world. We can therefore term this unitary phenomenon: "bodily space" and assert that it features an ineliminable enactive component.

Indeed, phenomenologists such as Heidegger and Merleau-Ponty consistently held that the lived body itself is not restricted to the same physical boundaries as the objective body when acting in the world. In the *Zollikon seminars,* Heidegger holds that «When pointing with my finger toward the crossbar of the window over there, I [as body] do

not end at my fingertips».[21] Similarly, the notion of "bodily space" encompassing the space surrounding the body is central to Merleau-Ponty's interpretation of the body schema. In the *Phenomenology of Perception*, Merleau-Ponty claims that «bodily space and external space [together] form a practical system»[22] and that through bodily space a «pact is established that *gives me possession of space* and gives to the things a direct power upon the body»[23] [emphasis added]. Thus, the lived body "possesses" its immediate spatial surroundings and from this possession a bidirectional relation between self and world is established in which the objective boundaries of the body are no longer adhered to and the lived body *in-corporates* "external space" into its outer boundary when engaging in certain tasks.

Thus, bodily space is not limited to the "mere" objective position occupied by the objective body but rather encompasses the space around it also; put differently, the area of space immediately adjacent to the body is just as much "mine" as the objective space that my material body physically occupies is "mine". This area of bodily space is not simply a meaningless void, indistinguishable from any other spatial area, but is fundamentally constitutive of the embodied mind which in finds itself located in space *as* an area for contextual bodily action.

Correspondingly, just as human beings do not actively engage the world via their objective body, neither do they engage their spatial surroundings via objective space. That is, in everyday experience, we do not experience our bodies as a "mere" collection of organic tissue just as we do not, when acting in the world, experience space as a "mere" Euclidian grid or a continuous volume. Instead, we engage and recruit space to navigate in and accomplish our worldly dealings by responding to object-affordances or by using tools to expand our area of influence; we feel at home or not-at-home in certain places or experience ourselves as closed-off-from or open-to other people. None of these factors appear particularly amenable to an objective and quantifiable account of space, yet they do remain intelligible from a phenomenological ("lived") perspective that emphasises the importance of body and action.

At first glance, it may seem self-evident that this notion that the body somehow extends further than its material boundaries, however intelligible for phenomenological

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[21] Martin HEIDEGGER, Medard BOSS (ed.), *Zollikoner Seminare. Protokolle, Gespräche, Briefe*, Klostermann, Frankfurt am Main 1987, tr. Franz Mayr and Richard Askay, *Zollikon seminars: Protocols, conversations, letters,* Northwestern University Press, Evanston IL 2001, p. 114/87. Technically, the space that one points to is likely to be outside of PPS. Some neuroscientists call this "extra-personal space" (EPS). However, both PPS and EPS are wholly dependent on a "bodily here" and are nothing like uniform, homogenous space.

[22] MERLEAU-PONTY, *Phenomenology of Perception*, p. 132.

[23] *Ibidem*, p. 298/261.

inquiry, is conceptually incompatible with scientific investigations of the body. After all, how could any productive scientific inquiry worthy of the title ever define the human body as something that extends beyond the epidermic layer? Despite this apparently unsurpassable conflict, several neuroscientists and cognitive scientists conceptualise the body and bodily space in a remarkably similar fashion when discussing the construct known as peripersonal space (PPS). Importantly, this conceptualisation also hinges on the assumption that the body is also somehow an enactive entity, and this facet defines its bodily space. So, what is peripersonal space?

De Vignemont and Iannetti[24] forward a "dual model" of PPS, distinguishing between *bodily protection* and *goal-directed action*. The latter category is of interest to us here. PPS is defined as the area of space surrounding the body and is said to act as a multisensory-motor interface or buffer with the world, modulating the agent's ability to interact with entities within grasping/reaching distance.[25] Historically, PPS was first posited as a hypothetical construct by Rizzolati et al.[26] to emphasise the sensorimotor properties of the brain, which synthesises sensory perception with motor-potentiality, enabling the embodied agent to flexibly act in the world and react to its demands.[27] Subsequently, Graziano et al. discovered peripersonal neurons (PPNs),[28] which serve as the neural correlate to the construct of PPS, as PPNs were found to react not only to objects in contact with the body, but to objects simply near to or approaching the body that made no physical contact. Phenomenologists thus seemingly pre-empted the notion that the embodied-enactive agent *experiences* near space on the basis that it is a *place* for embodied interactions.

Put simply, the brain responds very differently to objects within PPS to those outside PPS, prioritising nearby objects and people that enter its field and processing them as entities for potential interaction. An object existing within one's PPS has already been described using the Heideggerian term "ready-to-hand"[29] as it now presents itself as an immediately useful thing, thus modulating PPNs. Importantly, wielding particular tools

[24] Frédérique DE VIGNEMONT, Giandomenico IANNETTI, *How many peripersonal spaces*?, in "Neuropsychologia", 70, 2015, pp. 327-334.
[25] Chiara TENEGGI et al., *Social modulation of peripersonal space boundaries*, in "Current biology", 23, 5, 2013, pp. 406-411.
[26] Giacomo RIZZOLATTI et al., *Afferent properties of periarcuate neurons in macaque monkeys. II. Visual responses*, in "Behavioural brain research", 2, 2, 1981, pp. 147-163.
[27] Giuseppe DI PELLEGRINO, Elisabetta LÀDAVAS, *Peripersonal space in the brain*, in "Neuropsychologia", 66, 2015, pp. 126-133.
[28] Michael S. GRAZIANO, Gregory S. YAP, Charles G. GROSS, *Coding of visual space by premotor neurons*, in "Science", 266, 5187, 1994, pp. 1054-1057.
[29] Marcello COSTANTINI et al., *Tool-use observation makes far objects ready-to-hand*, in "Neuropsychologia", 49, 9, 2011, pp. 2658-2663.

can expand one's PPS because the agent can now act upon a greater portion of space,[30] as the tool is now (partially) embodied.[31] Moreover, certain PPNs are more receptive to certain parts of the body, activating when that body part is aligned with an object for a task.[32]

When thinking about bodily space from an embodied-enactive perspective, we might thus imagine a bubble surrounding the body which is pre-reflectively understood by the brain as a kind of ever-flexible sphere for interaction. Thus, the brain seemingly does not understand the area of space surrounding the body as identical to any other area of space but rather as an extension of the lived body, itself a vehicle for world-interaction as previously described. Accordingly, the lived body is inherently a spatial being so that body, space and world form a unitary phenomenon which can be described phenomenologically *and* investigated experimentally from an embodied-enactive standpoint.

How then might the phenomenological canon help us further flesh out the phenomenon of bodily space from an embodied-enactive perspective in-line with the empirical evidence? Two brief points warrant mentioning. For Heidegger, one of the most fundamental distinctions between the phenomenal and the objective is that things discovered phenomenally are rarely extant and homogenous. As discussed, the space of PPS is not static: its shape and size changes due to a variety of factors and different parts of the body will be emphasised by different neurons. Indeed, for Heidegger:

> The spatiality of Dasein, which is essentially not objective presence, can mean neither something like being found in a position in world space nor being at hand in a place. Both of these are kinds of being belonging to beings encountered in the world.[33]

As living human beings, we never find ourselves in an objective position like a three-dimensional object; our spatiality is flexible and infused with meaning, presenting as something that we inhabit and use, not something static and uniform we cognise. Indeed, research indicates that PPS is constantly updated and modulated on the basis of "worldly" factors such as mood an anxiety,[34] factors which certainly could not wield

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[30] Anna BERTI, Francesca FRASSINETTI, *When far becomes near: Remapping of space by tool use*, in "Journal of cognitive neuroscience", 12, 3, 2000, pp. 415-420.
[31] Frédérique DE VIGNEMONT, *Peripersonal perception in action*, in "Synthese", 2018, pp. 1-18.
[32] Andrea SERINO, *Peripersonal space (PPS) as a multisensory interface between the individual and the environment, defining the space of the self*, in "Neuroscience & Biobehavioral Reviews", 99, 2019, pp. 138-159.
[33] Martin HEIDEGGER, *Sein und Zeit*, in "Jahrbuch für Philosophie und phänomenologische Forschung", VII, 1927, tr. Joan Stambaugh, *Being and Time*, SUNY, New York 1996, p. 105/102.
[34] SERINO, *Peripersonal space (PPS) as a multisensory interface between the individual and the environment, defining the space of the self*.

any influence over objective, Euclidian space. Accordingly, we see how the world as a place for embodied interaction is constantly modulated by "subjective" factors, which continually reshape the enactive interface that surrounds my body.

Additionally, we discussed how for Merleau-Ponty, the body schema (that entity which acts as an interface and communion between self and world) is always spatial. Once more, we find areas for convergence regarding "objective" (*neuroscience*) and "lived" (*phenomenology*) approaches to cognition in reference to a singular cognitive domain (*spatiality*). We can add to this that Merleau-Ponty remarkably seems to pre-empt PPS research by thinking that the body schema (lived body/space) expands to assimilate physical objects. For example, when I am faced with a typewriter (we can update this example to a modern laptop) the structure of my body schema is altered so that my bodily space is now oriented to the type of task achievable through the keyboard, thereby including it within lived space:

> When I take my place before my machine, a motor space stretches beneath my hands where I will play out what I read. The word that is read is a modulation of visual space, the motor execution is a modulation of manual space.[35]

In no uncertain terms, Merleau-Ponty further pre-empts PPS literature in claiming: «The subject who learns to type literally incorporates the space of the keyboard into his bodily space».[36] The useful object now co-determines the kind of power-for-action that the agent has over their spatial surroundings whereby both the bodily agent and the object coalesce into a unitary phenomenon ("*literal* incorporation"), in turn directed towards the task at hand. From Heidegger and Merleau-Ponty we learn that, unlike objective space, lived space features an embodied here from which entities are understandable, is rarely homogenous or unchanging, is usually goal-directed and context-dependent and can incorporate other entities into its own outer boundaries when acting in the world.

Thus, while the lived body and concepts derived from it (e.g., body schema) have already been well-integrated into embodied and enactive approaches to cognition, it is important to highlight how lived space both expands upon this classical distinction and parallels its interdisciplinary applicability. Moreover, it showcases how the body, as an entity in space, is defined to a large extent by entities which are otherwise objectively external to it and engages its surroundings as a region for bodily action. Indeed, both phenomenological and empirical evidence suggests that bodily space is an integral

[35] MERLEAU-PONTY, *Phenomenology of Perception,* p. 179/145.
[36] *Ibid,* p. 180/146.

aspect of the lived body, perhaps even to the extent that a de-spatialised lived body is simply oxymoronic.[37]

A more in-depth analysis of lived space is beyond the scope of the present analysis. Of foremost importance, however, is noting that scientific inquiry, whether experimental and clinical, can seemingly incorporate methodologies which reveal both the lived *and* objective dimensions of a cognitive domain, synthesising each aspect into a singular account to articulate an embodied-enactive interpretation of cognition. To further corroborate this claim, we will now turn to the field of clinical psychology, in which the possession of conceptual tools for analysing lived space appear self-evidently essential. Not only is attention to the domain of lived experience important in its own right for clinical psychology, examining its logic showcases how embodied-enactive accounts can recruit clinical findings to evidence particular claims.

4. Bodily Space in Clinical Disorders

In psychiatric research, the first-person dimension to cognitive domains such as body, space, action, time etc., are often indispensable to any full-ranging investigation into a clinical disorder. For instance, if we aim to better understand how a patient's holistic sense of embodiment is disrupted during psychosis, solely attending to their anatomy (e.g., their body's objective properties) shall likely prove inadequate for our purposes. A shift in conceptual focus is required on the basis that the object of clinical investigation is oftentimes the patient's subjective experience of their condition. Conditions such as schizophrenia and bi-polar, even if they have well-defined, objectively-discoverable neurophysiological markers, would not be so deleterious if not for the cognitive-experiential impairments they confer. Other conditions such as phantom limb, or even the Schneider case discussed above, feature a misalignment between the lived and objective body, implying that they are therefore not always approachable using an identical notion of "body".

Continuing from our discussion of bodily space, an emerging body of literature is showcasing that several clinical conditions are marked by alterations in the PPS network. As illustrated by Noel et al.,[38] there are observable PPS disruptions in both schizophrenia and autism spectrum disorder (ASD), and Noel et al. actually posit that ASD and schizophrenia each occupy opposite poles of a PPS continuum. Specifically, PPS in ASD is posited by Noel et al. to be excessively "closed" to other nearby entities,

[37] Perhaps we can even say that only deceased bodies inhabit *solely* objective space.

[38] Jean-Paul NOEL et al., *The spatial self in schizophrenia and autism spectrum disorder*, in "Schizophrenia research", 179, 2017, pp. 8-12.

particularly people, whereas PPS in schizophrenia is excessively "open". During embodied interactions with others, the PPS of the former appears barely permeable, whereas with schizophrenia it appears overly permeable. Noel et al. hypothesise that these interpersonal disruptions might have a cascade effect for how clinical populations interact with the physical world, i.e., material objects. Crucially, this excessive openness or closedness, while spatial, does not necessarily denote a kind of spatiality that is objectively quantifiable at the experiential level.[39] Indeed, while the authors adopt a broadly scientific approach without mentioning phenomenological accounts of spatiality, they nevertheless cite phenomenological notions of selfhood as foundational to their interpretation of the empirical results.[40]

How then might emphasising the "lived" aspect of spatial deficits, and the degree to which space is embodied and enactive, prove useful in this context? As shown by Teneggi et al. and Maister et al.,[41] while the individual PPSs of two neurotypical individuals appear to merge together following co-operative activity, this effect is not always observed with ASD populations. However, if we were to apply a quantifiable model of distance, we would find that the control subject and the subject with autism are both of an equal distance to the second person in the experiment. There is therefore some spatial distinction that is not solely describable in objective terms. Similarly, in *Being and Time*, Heidegger draws a parallel distinction between spatial "distance" and "nearness". While distance is objective (e.g., how many centimetres are between point Y and Z), nearness denotes how phenomenally integrated I am with another entity. Therefore, when redirecting toward *lived* space, a distinction becomes articulatable insofar as we understand the salient difference to be one of *nearness*, whereby the autistic individual is phenomenally closed-off-to the other (their peripersonal spaces have not merged) and has not integrated themselves into the co-spatiality (nearness) typical of co-operative, intercorporeal activity.

In line with this, Heidegger claims: «Beings "at hand" have their various nearnesses which are not ascertained by measuring distances. Their nearness is determined by the handling and use».[42] Therefore, there exists a profoundly enactive component to lived space whereby, in this case, functional, co-operative activity ("use") might serve as the

[39] Unless we are speaking specifically of the measurement of its neural correlate. This will be dealt with in the next section.

[40] Josef PARNAS, *The self and intentionality in the pre-psychotic stages of schizophrenia*, in Dan ZAHAVI (ed.), *Exploring the self: Philosophical and psychopathological perspectives on self-experience*, John Benjamins, Amsterdam 2000, pp. 115-147.

[41] Lara MAISTER et al., *Your place or mine: Shared sensory experiences elicit a remapping of peripersonal space*, in "Neuropsychologia", 70, 2015, pp. 455-461.

[42] Martin Heidegger, *Being and Time*, p. 103/100.

true measure of success even if this co-operation requires no explicit consciousness of success conditions on the part of the agents. Nearness is therefore determined by interaction and this enactive conception of intercorporeal spatiality shares some similarities with the Interactive Theory of social cognition proposed by Gallagher (2020).[43] Indeed, if this is the case, we find another area for convergence between enaction, embodiment, and spatiality in the form of intersubjectivity, which Di Paolo and Thompson note has been a long-standing concern for enactivism.[44] Here, then, enactivism is integral to an interdisciplinary model of spatiality as it suggests that human beings *understand* space by actively engaging it to successfully interact with entities, which in turn helps them to understand other people. The "breakdown" of such an understanding can thus have dire clinical manifestations.

Important spatial distinctions can become transparent to investigation not only by measuring the distance between two individuals (as the distance was identical in both cases) but rather by including the qualitative fact that the autistic individual's sense of space has not merged with that of the other, who remains for them as something phenomenally remote. With schizophrenia the opposite phenomenon is observable, so that people with schizophrenia remain excessively open and permeable, with their PPS merging too easily with others. This culminates in an excessive nearness (over-integration) with other entities, so that they can be said to suffer from an excessive integration, in which the typical self-other boundary blurs. Once again, this integration (or lack thereof) is not something that is necessarily best understood quantifiably but phenomenologically, even if in interdisciplinary cognitive science this argument might be supported by empirical findings.

In light of this, I argue that the conceptual tools operationalised to reveal space in its objectivity cannot always disclose how clinical subjects experience spatial disruptions in their day-to-day existence. For that, we can turn to phenomenology in order to disclose spatiality's first-person, embodied and enactive characteristics. Indeed, even if we otherwise pivoted to the patient's *first-person experiences of objective space* (how patients cognise or think about objective space) we would still fail to describe the appropriate kind of first-person spatial disruption, as the patient may not suffer from any deficits in their understanding of objective space. For instance, a person with autism may be perfectly proficient at measuring a door frame or estimating the height of a person (objective space) yet still remain closed-off-from the other (lived space) in certain situations. It is on this basis that psychiatry can benefit from phenomenology in lieu of

[43] Shaun GALLAGHER, *Action and interaction*, Oxford University Press, Oxford 2020.
[44] DI PAOLO, THOMPSON, *The enactive approach*, p. 74.

alternative first-person methodologies due to the *particular kinds* of first-person experience (i.e., lived experience) inherent to some disorders.

Finally, it should be reiterated that the inadequacy of some forms of objective analysis for some clinically-oriented research initiatives is in no way posited as a black stain against objective inquiry in itself. In both psychiatry and interdisciplinary cognitive science alike, it often appears to be the case that each mode of analysis is of equal necessity in order to paint a full picture of the condition. For example, we might search for neurodevelopmental markers of schizophrenia but then disclose its cognitive-experiential correlate(s) with a separate methodology. Alternatively, we may integrate both aspects at different stages of the research process, such as by using phenomenological tools to access first-person descriptions of experience before subsequently operationalising those descriptions to develop a diagnostic criterion. For instance, a phenomenological analysis of lived space might help us create an itinerary used to diagnose ASD by searching for characteristic distortions of lived space.

Indeed, when conceiving of the compatibility between phenomenology and neuroscience we should recall Varela's dictum that, where possible, neuroscience and phenomenology should be "mutually illuminating" to one another.[45] With this facet in mind, we shall finally briefly examine the methodological relationship between neuroscience and phenomenology, as well as how each fits together when articulating an embodied-enactive model of cognition.

5. Phenomenology and Neuroscience

At this point, it is important to examine the wider implications nascent in any methodological alliance between the neurosciences and phenomenology, as its legitimacy has wider implications for the success of embodied-enactive approaches generally. Arguably, one of most fertile areas for collaboration between phenomenology and neuroscience circles the body of literature that has followed the discovery of mirror neurons (MNs). Since their discovery, several authors (including the discoverers themselves) have explicitly highlighted how the kind of social cognition that mirror neurons facilitate can be illuminated by recourse to texts in the phenomenological canon, while also emphasising the body's role in social cognition.[46]

[45] Francisco J. VARELA, *Neurophenomenology: A methodological remedy for the hard problem*, in "Journal of consciousness studies", 3, 4, 1996, pp. 330-349. In light of this, it is noteworthy that Varela and his collaborators also introduced the term "enactivism" into cognitive science.

[46] Vittorio GALLESE, *Mirror neurons, embodied simulation, and the neural basis of social identification*, in "Psychoanalytic dialogues", 19, 5, 2009, pp. 519-536; Marco IACOBONI, *Mirroring people: The new science*

Following Merleau-Ponty, the body is seen as playing a prominent role in MN-enabled social cognition and Gallese, a co-discoverer of MNs, cites Merleau-Ponty's phenomenology as informative to his "embodied simulation theory" of mirror neuron functionality.

It is perhaps not insignificant to the wider case presented here that Rizzolatti,[47] a co-discoverer of mirror neurons, also hypothesised the existence of a theoretical peripersonal space before peripersonal neurons were empirically discovered. Moreover, Gallese has argued for the "phenomenologisation of neuroscience" itself and has linked PPS with Merleau-Ponty's notion of *praktognosia*.[48] Accordingly, PPNs and MNs are therefore suitable case examples for the kind of communion between phenomenology and neuroscience that, taken together, support an embodied-enactive interpretation of cognition. Can exposing some conceptual connection between PPNs and MNs via embodied-enactivism thus be revelatory here?

Peripersonal neurons and mirror neurons are both sensorimotor neurons that can be found across several neural regions. Importantly, both seemingly underlie a kind of pre-reflective cognition, a type of cognition that is more difficult to capture with computational language and which may feature significantly embodied or enactive qualities.[49] According to such scholars, my mirror neurons allow me to perceive the intentionality inherent to the actions of others without recourse to theoretical, reflective cognition on my part. In parallel, it appears that peripersonal neurons modulate the way in which objects (and others) are presented to the agent before he has the opportunity of making a conscious judgement about their usefulness, or lack thereof. The shape of one's PPS is highly dependent on affect, others and sensory input while, simultaneously, it also prepares and enables my body's capacity for interaction with the environment in a reciprocal fashion.

Thus, both PPNs and MNs seem to cohere with an embodied-enactive interpretation of mind and brain. Indeed, both sets of neurons are sensorimotor neurons and Merleau-Ponty consistently emphasised the inseparable role of sensory perception and action, a tenet that is now a considered foundational to the enactivist approach to mind. In his words, space «appears at the intersection between my motor intentions and my perceptual field» whereby «a pact is established that gives me possession of space and

of how we connect with others, Farrar, Straus and Giroux, New York 2009; Dan ZAHAVI, *Empathy and mirroring: Husserl and Gallese*, in Roland BREEUR, Ullrich MELLE (eds.), *Life, subjectivity & art*, Springer, Dordrecht, 2012. pp. 217-254.

[47] RIZZOLATTI et al., *Afferent properties of periarcuate neurons in macaque monkeys. II. Visual responses*.

[48] Vittorio GALLESE, *Neuroscience and phenomenology,* in "Phenomenology and Mind", 1, 2011, pp. 28-39.

[49] IACOBONI, *Mirroring people: The new science of how we connect with others*.

gives to the things a direct power upon the body».[50] Thus, we may infer that, perhaps somewhat surprisingly, the integration between phenomenology and neuroscience may partially depend on technological progress in neuroimaging techniques, as in the cases outlined above, the impetus for including phenomenology came subsequent to what were essentially neurophysiological discoveries.

One task for interdisciplinary cognitive science may therefore be that of supplying a theoretical-conceptual framework in which to ground such empirical discoveries. Within this interdisciplinary framework, phenomenology's role becomes that of conceptually contextualising the findings provided by objective investigations conducted in neuroscience (e.g., neuroimaging data) by articulating their "subjective", pre-reflective correlate (e.g., lived experience). Indeed, this conforms to Varela's original conception of neurophenomenology,[51] in which Varela lamented that the tools available for interrogating the intricacies of lived experience had seemingly fallen behind the sophistication of our capabilities for mapping the brain's activity. This means that while a considerable amount of neuroscientific work relies upon objective modes of discovery - the measurement of EEG signals and topological knowledge of brain regions to name but two – the so-called cognitive dimension can be augmented through the inclusion of phenomenological analysis.

It is in precisely this way that "objectivity" and "subjectivity" can mutually inform one another in experimental neuroscience and, correspondingly, in theory-heavy interdisciplinary fields such as embodied-enactive cognitive science. Objective measurement tools are undoubtedly essential for understanding the strictly neurobiological properties of the brain. Objective analysis can confer a wealth of information regarding, say, the patient's synaptic structure or the most appropriate form of medication to modulate a neurotransmitter deficiency. But the "cognitive correlate" of both mirror neurons and peripersonal neurons (and perhaps other classes of neuron also) are seemingly not as readily discoverable with such tools. The respective types of social and spatial cognition that they engender are not (directly) those found in conscious deliberation; say, interpreting a hypothetical character's motivation or estimating the depth of a swimming pool. Instead, they better conform to the kind of "cognition" expounded in phenomenological texts: i.e., cognition that is describable as pre-reflectively embodied and enactive.

Therefore, for certain cases in both experimental neuroscience and clinical psychology such as those outlined above, phenomenological analysis can be employed

[50] MERLEAU-PONTY, *Phenomenology of Perception*, p. 298/261.
[51] VARELA, *Neurophenomenology: A methodological remedy for the hard problem*.

to reveal the "cognitive correlate" to particular kinds of neuroscientific discovery in lieu of alternative paradigms.

6. Conclusion

We have witnessed how the classical distinction between the lived and objective body, and the emerging distinction between lived and objective space, serve as loci for productive cross-disciplinary interactions between phenomenology, psychiatry and cognitive neuroscience. One culmination of this interdisciplinary convergence assumes the form of an embodied-enactive approach to mind. In this discussion, I have opted for breadth over depth in the provision of a general overview of just some of the multifaceted ways in which the combinatory investigations of both the "lived" and "objective" can help tackle certain cross-disciplinary research questions in a mutually informative way by emphasising a common need for articulating a central role for embodiment and enactivism.

After highlighting the importance of including "lived" (i.e., embodied and enactive) dimensions in some forms of empirical inquiry, I further argue that the underlying logic of these dimensions is only exposable *if* our conceptual and descriptive tools are adequately refined and correctly directed. When these conditions are met, phenomenology can fulfil the function of "theory" in embodied and enactive approaches to cognitive science. Phenomenology is thus potentially valuable because the kind of "cognitive correlate" that is most suitable for an embodied-enactive approach is arguably not "cognitive" at all in traditional usage of the term. The embodied and enactive components of the mind that require articulation are dimensions of consciousness which are not best described in terms of explicit cognitive content; rather, they always already ground the mind in its dynamic, context-driven, meaningful and pre-reflective interrelationship with the world.

Finally, we must be careful to acknowledge that the phenomenologist's interest in first-person experience does not invalidate what is an ultimately structural inquiry into the subject matter of lived experience. It is surely not sufficient if we as cognitive scientists merely introspect and offer untrained and divergent accounts of our subjective experiences of space, intersubjectivity or embodiment. Were this the case, we could not offer structural accounts of, say, lived space or the lived body to cohere with the kinds of experimentally replicable discoveries made in the neurosciences (i.e., PPNs and MNs). Certainly, it is no good if my idiosyncratic experience of space or body differs wildly from yours and everyone else's. Similarly, with regards to clinical disorders, even if the experiences of lived space for people with autism is non-identical to those of

neurotypical individuals, they should nevertheless be shared by people with autism in important and recognisable ways. Thus, attentiveness to the reliability and validity of our accounts must be applied as equally to lived experience as they are to our objective investigations into the brain.

In conclusion, while we might claim that the "lived" dimensions of a disorder or a neurophysiological phenomenon are subjective, they are not "merely subjective" in the sense of producing unreliable, divergent data. As Gallagher and Zahavi note,[52] phenomenology is a discipline that hinges upon philosophical argumentation, not introspection or folk psychology. This paves the way for continued productive collaborations between both lived and objective forms of analysis in interdisciplinary approaches, such as when the need arises for articulating embodied-enactive models of cognition as outlined above. Therefore, continuing to hone our investigative tools regarding both the lived and objective dimensions of the human mind should facilitate continued progress in interdisciplinary cognitive science, particularly where alternative philosophical frameworks appear inadequate in the face of emerging empirical findings.

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