Evidence in Neurophenomenology

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Abstract

Since Varela (1996) first introduced the term ‘neurophenomenology’, the assimilation of neuroscientific and phenomenological forms of evidence has become increasingly prominent in the cognitive sciences. Over the past quarter-century, neurophenomenological approaches have facilitated several notable successes and have been increasingly utilised to tackle a myriad of theoretical and methodological problems. However, an oft-voiced and persisting concern pertains to the prospective incongruity of combining objective, third-person forms of evidence with first-person, so-called ‘subjective’ forms of evidence. According to some critics (Ryle 1949; Dennett 1991; Hardcastle 1996), the inclusion of phenomenological and therefore subjective, biased, and anecdotal first-person accounts of experience and cognition are of little utility or compatibility with a ‘hard science’ such as neuroscience.

Furthermore, the kind of research initiatives that are labelled as ‘neurophenomenological’ are surprisingly heterogenous and, on examination, the logic governing each methodological approach is not necessarily interchangeable. Thus far, little scholarly attention has been paid to disaggregating and defining the diverse standards of evidence and validation operative in neurophenomenological research programmes, and how they might differently overcome the problem of integrating ‘objective’ and ‘subjective’ forms of evidence.

To address this lacuna in the current scholarship, I propose the existence of three identifiable sub-categories of neurophenomenological research: 1. Interpretative Neurophenomenology; 2. Experimental Neurophenomenology; 3. Constitutive Neurophenomenology. After articulating the defining characteristics of each neurophenomenological approach, I examine how each confronts the problem of

establishing and validating its claims. I achieve this by evaluating three exemplary instances of past neurophenomenological research. Thereafter, I analyse the kinds of theoretical implications that can be extracted from each case example and how this information might help to provide a roadmap for future research in the cognitive sciences.

Contents

Introduction

I. Varela's Neurophenomenology

The term 'neurophenomenology' was inaugurated in Varela's (1996) essay: "Neurophenomenology, A Methodological Remedy for the Hard Problem". Ostensibly formulated in reaction to Chalmers' (1995) then-recent articulation of the "hard problem of consciousness", Varela's proposed solution was not explicitly wedded to resolving the conflict between mind and brain as Chalmers conceived it. For Varela, to sharply juxtapose 'physicality' and 'mentality' would simply perpetuate the flawed conceptual presuppositions that he wished to overturn.

Instead, Varela aimed to ignite a foundational transformation in the way certain types of neuroscientific research are conducted and their findings are philosophically grounded. Varela argues that the 'problem' troubling Chalmers (and others) is categorically unsolvable through discovering some as-yet-undetermined empirical correlation or an undiscovered neural region. Thus, in absolving neuroscience of its Cartesian residuals, included therein must be any revitalised search for a contemporary equivalent to the pineal gland, a neural region that can somehow 'connect' psyche and body.

Instead, Varela hypothesised that the emergence of the 'hard problem' reflected a methodological blind-spot in the neurosciences; specifically, that neuroscience lacked possession of a focused methodology appropriate for integrating structural accounts of 'first-person' experience. In response, Varela advances an approach "armed with pragmatic tools enabling [the development of] a science of consciousness [to] move beyond the hard problem". Crucially, Varela's remedy aims to "marry modern cognitive science and a disciplined approach to experience", with

the latter role to be explicitly provided by or informed by the phenomenological tradition. By following this formula, Varela suggests, the ‘hard problem’ is unmasked as a pseudo-problem and, in its place, we obtain an implementable way of credibly linking the domains of brain and experience from the ground-up.

Guiding the neurophenomenological enterprise is the proposition that brain and experience each share a status of “irreducibility”. That is, Varela believes that both experiential and neural phenomena are inextricably entwined, yet, simultaneously, both are seemingly structured according to their own, semi-autonomous logic. Accordingly, as neither dimension can be assiduously reduced to the other, neither dimension is eliminable for any comprehensive account of mind. Furthermore, so-called ‘first-person data’ is already seen as a crucial determinant in the evaluation of neuroscientific evidence.

Indeed, as Price and Aydede, (2005) suggest, both physical and emotional pain recruit the brain area known as the anterior cingulate gyrus; to further investigate the degree of similarity or difference between these two ‘pain’ phenomena, we might pivot to their manifestation in lived experience. Similarly, Rudrauf et al. (2003) illustrate the incoherence of seeking to eliminate the ‘subjective-experiential’ domain during the process of explanation, despite treating this domain as an *explanandum*.

However, Varela implies that many of the investigative tools employed to describe experience in neuroscientific research are somewhat ‘blunt’, particularly when the researcher must turn away from reflective cognition (and its neural correlates) to the less transparent domain of prereflective experience. Even where accounts of experience successfully demonstrate explanatory utility, Varela suggests that their terminological employments are often descriptively impoverished: “what is missing is

not the coherent nature of the explanation but its alienation from human life". In parallel, neuroscience's ever-expanding compendium of empirical discoveries, while not invalidating 'qualitative' approaches to mind, cannot be overlooked by them either. Thus, Varela argues in favour of employing a systematic methodology to investigate and catalogue experiential phenomena that will mirror the methodological rigour with which neuroscientists investigate the brain. In an optimal scenario, these dual forms of investigation should not compete with one another for explanatory dominance but coalesce into a singular, "mutually illuminating" conceptual framework.

To further elucidate why Varela believes that both neurological and experiential evidence are "irreducible" for any comprehensive study of the mind, we should briefly review how they intersect on a theoretical, practical and institutional plane. Substantiating Varela's position will require a cursory assessment of the points of convergence that exist between phenomenology and neuroscience as well as a glance at where exploitable opportunities and potential conflicts may arise.

II. Who Should Study the Mind? Neuroscience, Philosophy and Cognitive Science

Arguably, neuroscience often finds itself situated on a border between the natural and the social sciences; perhaps a third point of convergence should include the 'humanities' also. Like many borders, that between the natural sciences, social sciences and humanities have been subject to historical disputes of ownership, repeated attempts at reunification and the annexation of lost territory. Recently, the interdisciplinary field of cognitive science has assumed the duty of integrating these heterogenous disciplines into a coherent account of mind by focusing on clear zones

of mutual interest: i.e., language, movement, sociality, self-consciousness and so forth. Neurophenomenology represents one such effort at constructing a unificatory sub-discipline that seemingly straddles this interdisciplinary border, recruiting evidence from across disciplines towards a defined research goal.

Why might adopting a cross-disciplinary methodology be necessary for neuroscience? The brain, as an entity made up of organic matter, weighable and measurable like any extended object, is straight-forwardly amenable to the 'hard' scientific investigations of biology, physics, and chemistry. Indeed, 'neurobiology, 'psychophysics' and 'neurochemistry' all represent lively sub-fields of neuroscientific investigation. Furthermore, just like any internal organ, the brain can be studied, mapped and even manipulated with sophisticated imaging technology and surgical techniques. Yet, any comprehensive methodology seeking to tackle the functioning of this organ motivates a conceptual shift into the purview of the humanities and social sciences.[1] Due to its close intimacy with the more abstract (and contested) domain of consciousness, acquiring knowledge of the brain's complexities often demands an equally sophisticated inquiry into human thought, emotion, communication, and so forth.

Supposedly, phenomenology represents an appropriate method for interrogating such domains which, as discussed, are frequently treated as indispensable items of evidence in neuroscientific studies. Phenomenology thus affords a systematic methodology designed around revealing experiential structures that, while neuroscience readily admits are crucial to interpreting its findings, may occasionally lack the requisite tools to do so. Furthermore, neurophenomenology is well-situated

[1] Though it is important to note that neurophenomenology is not a functionalist approach to mind.

within a broader, on-going dialogue between philosophy and neuroscience, whereby recent decades have witnessed theoretical neuroscience continually breach a level of conceptual complexity as to inevitably brush up against philosophical problems. Indeed, there has been a renaissance of interest in philosophical problems freshly approached from a neuroscientific standpoint in which neurophenomenology may have important things to say.

In part, neuroscience's growing receptivity to philosophical modes of analysis is motivated by the lightning pace at which its research findings accumulate, a pace which often exceeds researchers' abilities to cement a cohesive theoretical framework. As Thompson (2006) illustrates, though cognitive science is "institutionally well-established, it is not a theoretically settled 'Weld'" as compared with other disciplines. Indeed, the magnitude of neuroscientific discoveries, along with their sometimes counter-intuitive implications, frequently heighten neuroscience's receptivity to philosophical examinations of its evidence.

As the empirical evidence frequently points toward a need to define or fundamentally reconceptualise complex conceptual notions (including the definition of 'mind' itself), the road is thus paved for philosophical contribution, with several neuroscientists having cited phenomenology as the form of philosophy most conducive with their discipline's demands (Iacoboni 2006; Cole 2008; Gallese 2011).

III. The Neurophenomenological Enterprise

At this juncture, it is helpful to briefly articulate some of the more general, positive positions that characterise neurophenomenology as a methodology. Firstly, the neurophenomenologist is likely to emphasise that reporting the first-person dimension in ordinary language or borrowing terminology from hard scientific

disciplines such as physics, may not be congruent with the task's requirements. Additionally, neurophenomenologists posit that phenomenological descriptions should, ideally, provide more than just contingent information regarding a subject's individual psychological character. Rather, neurophenomenology should aim to reveal invariant structures of consciousness so that it is better aligned with neuroscience's aim of revealing invariant neurophysiological structures. Of related epistemological relevance here is the phenomenology-derived notion of the 'un-concealment of experience'. This notion holds that phenomenal experience is an existent, discoverable facet of the world, amenable to accurate reportage and peer review, provided the conceptual tools are right for the job:

> We are convinced by empirical and intuitive evidence that our human experience follows some fundamental structural principle which, like space, enforces the nature of what is given to us as contents of that experience (Varela, 1996).

Indeed, even if Husserl's conviction that phenomenology discloses 'essences' is suspended, integrating phenomenology with neuroscience may nevertheless help to disclose replicable *phenomenological* profiles that can reliably map onto corresponding patterns of neural activity or neurobiological phenotypes. For example, a neurological profile common to those diagnosed with schizophrenia could potentially be mapped onto a co-occurring *phenomenological* profile.

Therefore, theoretically, and methodologically, neurophenomenology echoes Husserl's strategy of defining the structures of experience through revealing their essential characteristics. Furthermore, as will be discussed, several instantiations of neurophenomenological research simultaneously echo Heidegger's emphasis on conceiving the agent as situated in a network of contextual meaning alongside

Merleau-Ponty's emphasis on embodiment and the compatibility between phenomenological analysis and psychological research findings.

One further caveat of note is that neurophenomenology must retain some loyalty to its parent disciplines. A threshold can be passed at which point neurophenomenology resembles neither neuroscience nor phenomenology; as such, neurophenomenology must carefully navigate the conventions, terminological employments and evidential criteria of each discipline, making informed and cautious compromises when necessary. For instance, if a purportedly neurophenomenological approach makes unqualified usage of 'action representations', the phenomenologist's suspicion may be aroused. Simultaneously, neurophenomenology must adhere to the principles of validity and reliability integral to good scientific practice, particularly if its claims are to be supported by empirical evidence. Speculations that stray too far from the empirical evidence will not survive the 'Occam's razor' wielded by science; in this sense, neurophenomenology may be encumbered by constraints that phenomenology is not.

Therefore, if Varela is correct, neurophenomenology is capable of adhering to the customs of scientific validity ("are we accurately identifying the particular experience we intend to identify?") and reliability ("will other researchers replicate these results?") while retaining a degree of autonomy in its philosophical assumptions and methodological outlook. If both neural and phenomenal properties are 'objectively' discoverable, and brain and experience are intimately interconnected, perhaps both can be accurately revealed in dialogue with each other.

Finally, it is reasonable to assume that the onus must be placed on neurophenomenology to justify its existence as a distinct sub-discipline. Evaluators

and adopters of neurophenomenology must continually question themselves as to what precisely is gained from neurophenomenology that would not be otherwise achievable with an alternative neuroscientific approach, or from each discipline operating independently.

However, that neurophenomenology synthesises the disciplines of neuroscience and phenomenology into a singular account does not necessarily enlighten us as to how this synthesis should be practically implemented, or which research problems it should focus its efforts towards. To date, little work has been conducted toward establishing a taxonomy of the somewhat heterogenous neurophenomenological approaches currently in use.

Our present concern pertains to how the disciplines of neuroscience and phenomenology might be viably synthesised on a systematic basis and how the products of such a synthesis should seek to evidence their claims. Thus, we return to the central question of exactly what constitutes a ‘neurophenomenological approach’. Using Varela’s (1996) dictum that neurophenomenology operationalises the “mutual constraints and illumination” provided by neuroscience and phenomenology, the moniker ‘neurophenomenology’, can be applied both broadly and retroactively to a variety of research programmes.

There is currently an assortment of methods that fit the bill. For instance, Ratcliffe (2002) argues that the neuropsychology of emotion is conceptually augmented via Heidegger’s notions of mood and attunement. Gallagher and Cole (1995) offer an innovative phenomenological reading of a neuropsychological patient, which echoes

an even earlier methodological approach pioneered by Merleau-Ponty (1945).[2] By contrast, several authors take for granted that neurophenomenology designates a specific experimental protocol designed for generating specific forms of data. Indeed, despite Varela's (1996) insinuation that neurophenomenology designates a specific experimental procedure in his original essay, his later work (1999a; 1999b) negates this narrower interpretation. Actually, Varela's (1996) initial formulation of the neurophenomenological programme contained the nascent form of each type of neurophenomenological method identified below.

As such, we will utilise 'Varela's dictum' (the proclaimed mutual co-dependency of phenomenology and neuroscience) as our guiding classificatory principle. Employing this classification, there exist three major, identifiable approaches to neurophenomenological research, past and present: (1) **Interpretative Neurophenomenology** (I-NP); (2) **Experimental Neurophenomenology (E-NP)**; (3) **Constitutive Neurophenomenology (C-NP).**

1. Interpretative neurophenomenology grounds and expounds existing empirical results taken from the neurosciences within a phenomenological framework of interpretation. Historically, this approach may have been adopted when dominant interpretative frameworks (i.e., behaviourism or cognitivism) failed to capture an essential piece of the conceptual puzzle or convincingly relay the 'cognitive-experiential correlate' to a study's neurological discovery. To explicate the logic driving this approach, we will utilise Merleau-Ponty's (1945) phenomenology of

[2] Indeed, if neurophenomenology designates any systematic practice that dynamically integrates the study of experience with the study of the brain, its inception can be traced as far back as Merleau-Ponty's (1945) Phenomenology of Perception.

motor-intentionality and his interpretation of a well-known neuropsychological case study provided by Goldstein & Gelb (1918;1921).

2. *Experimental neurophenomenology* is closer to a standard (neuro)scientific experimental protocol in that it seeks to generate novel datasets in a laboratory setting, from which it then draws conclusions. Crucial to this instantiation of neurophenomenology is that the experiment must produce neurological and phenomenological data in tandem. 'Neurological' and 'phenomenological' datasets are produced using separate measurement tools but, for the experiment to be deemed successful, both datasets must display a robust correlation between each other. This approach will be explored by analysing Petitmengin's (2009) meta-review, which draws on several years of experimental neurophenomenological research on epilepsy.

3. *Constitutive neurophenomenology* emphasises the wide-scale integration of various findings from the neuroscientific and phenomenological literature, predominantly for the purpose of illuminating a broadly defined 'construct' or 'cognitive domain'. This instantiation of neurophenomenology departs from examining or producing a single dataset or case study and instead aims to formulate an integrative model of a delineated 'cognitive domain' (e.g., agency, spatiality, memory, etc.). Accordingly, constitutive neurophenomenology aims to showcase how a cognitive domain is fundamentally constituted according to its invariant phenomenological and neurophysiological characteristics. From this, researchers can extract an operational definition of the domain studied that may also be of utility to other clinical or experimental protocols. To understand this approach's internal logic, we will evaluate a broad and on-going research programme that integrates mirror neuron research with phenomenological accounts of empathy.

In what follows, we will assess each of the neurophenomenological approaches outlined above through an in-depth examination of three exemplary research programmes representative of their category. From this, we should expect to achieve greater clarity regarding the internal logic that guides each approach, which obstacles they may have to overcome and what standard of proof they should aim to attain. Thereafter, we intend to extract guiding principles from each exemplar to provide a roadmap for future researchers wishing to adopt a neurophenomenological methodology. While the programmatic provided here will not be exhaustive, cataloguing the different instantiations of neurophenomenological research, and the heterogenous evidential criterium that structure them, is a timely contribution to the wider neurophenomenological enterprise that has apparently proven itself a mainstay of contemporary cognitive science.

Chapter 1: Interpretative Neurophenomenology: Merleau-Ponty's Neuropsychology

I. Introduction

Not only is Merleau-Ponty perceived as a something of a canonical phenomenologist, he represents one of the earliest figures to productively synthesise phenomenological and (neuro)scientific research findings. In pursuit of this goal, Merleau-Ponty showcases how, by focusing on areas of mutual interest, phenomenological inquiry and empirical investigation can mutually inform one another. Indeed, in his magnus opus *Phenomenology of Perception* (*PoP*) (1945/2012), Merleau-Ponty frequently extends Heidegger's phenomenological assault on Cartesian metaphysics to include the fields of neurology, physiology and psychology, confidently claiming: "the psycho-physical event can no longer be conceived in the manner of Cartesian physiology" (118). Crucially, 'Cartesian physiology' does not denote Descartes' strictly physiological work, but the Cartesian doctrine of substance dualism:

> the union of the soul and body is not established through arbitrary decree that unites two mutually exclusive terms – it is accomplished at each moment in the movement of existence (118).

From this statement, we learn that Merleau-Ponty's occasional term for 'mind' or 'consciousness' - *the psycho-physical event*[3] - is incompatible with Cartesian dualism. However, for Merleau-Ponty, this does not rule out the possibility that a philosophical investigation into 'consciousness' (the 'psycho-physical event') can incorporate evidence from the sciences. Indeed, Merleau-Ponty frequently presents

[3] A coinage developed by Husserl in Ideas II.

his phenomenological work with one foot in the biological and human sciences, as evidenced by the importance he bestows to biology, physiology, psychiatry, and neurology, frequently drawing on such disciplines in support of a claim being made.

However, of primary interest for our purposes is the way in which Merleau-Ponty occasionally replicates the fundamental investigative logic operative in fields such as neuropsychology and, more specifically, how the introduction of phenomenological resources can inform the interpretation of neuropsychological research findings. Indeed, Merleau-Ponty offers what is perhaps the first template through which empirical findings in the neurosciences are illuminated with recourse to phenomenology (and vice versa), a proto-example of the principle of 'mutual circulation' subsequently identified by Varela (1996).

As perhaps the earliest adopter of a neurophenomenological approach, Merleau-Ponty is a fitting first choice to analyse here. In what follows, we will evaluate how Merleau-Ponty's interpretative neurophenomenology (I-NP) elucidates both a (neuro)psychological construct *and* a neuropsychological case study through the provision of a phenomenology-derived interpretative framework. Additionally, we will examine how this same investigation showcases how phenomenological inquiry can be developed in dialogue with empirical findings.

II. Merleau-Ponty's Neurophenomenological Method

Merleau-Ponty seeks to examine the so-called 'psycho-physical event' with an investigative technique analogous to that of neuropsychology; namely, Merleau-Ponty seemingly believes that *functionality* can be inferred from analysing *dysfunction*. Merleau-Ponty routinely employs this logic whenever expounding a selected phenomenon (e.g., 'sensation'), contrasting normative with pathological

manifestations of the phenomenon under scrutiny, investigating the ‘normal’ through the path opened up by the ‘abnormal’. Crucially, Merleau-Ponty’s criterion for ‘abnormal’ rarely makes use of the hypothetical. Instead, he borrows examples directly from the clinical literature, frequently employing medically accepted definitions of neurological disorders without adjustment.

Indeed, for both neuropsychology and Merleau-Pontian phenomenology, extracting inferences from pathology serves a pragmatic necessity. The relationship between mind and brain (neuropsychology) and self and world (phenomenology) are complex, often eluding straightforward, common-sensical analysis. Indeed, as Merleau-Ponty is wont to show, integrating both accounts into a single analysis can help evidence claims made in the other. Moreover, neuropsychology itself is not a science like chemistry or physics because the ‘first-person dimension’ is always included at the forefront of the investigation. Accordingly, developments in neuropsychology rarely stem from ‘purely’ physiological findings and instead depend somewhat on researcher’s abilities to accurately ‘capture’ cognition-experience via a careful description of its intricacies, a role that, in principle, can be fulfilled by phenomenology.

Because Merleau-Ponty emphasises that the patient represents a way of being in their own right, a distinct ‘opening onto the world’, the clinical case study represents an invaluable resource. The patient’s ‘opening onto the world’ is not a thought experiment, nor is its nature easily replicated in the experimental setting. Correspondingly, Merleau-Ponty recognises that the detail-rich, neuropsychopathological case study offers a valuable window to witnessing the self-world dynamic in an atypical configuration in a way that simultaneously provides a qualitative depth frequently absent in experimental and statistical analyses.

The notion that neuropsychopathology offers a window into an otherwise opaque phenomenon is reminiscent of Heidegger's notion of breakdown. Breakdown emerges when an otherwise opaque facet of absorbed coping becomes temporarily blatant because of a 'break' in its regular seamlessness. In neuropsychology, 'breakdown' helps to showcase the function of a neural region whereby the detection of a localised lesion (e.g., the hippocampus) enables researchers to infer the purpose of that region (e.g., memory) through observing where cognitive-experiential deficits manifest.

For example, Ellis et al. (1992) distinguish between two kinds of semantic deafness: *pure word deafness* (when the patient hears all sounds normally except for words) and *word form deafness* (where the expression of words are heard but manifest as uninterpretable distortions). A breakdown in *one* of these components imply *both* are necessary for regular word comprehension. In another study, Anderson, Damasio and Damasio (1990) describe a patient who lost the ability to read and write letters and words but who retained an excellent number-*processing* ability. The patient could read, write and calculate numbers with ease *only if* a number was written as a numeral ('*11*') but not as text ('*eleven*').

Neuropsychologists designate such symptoms: 'double disassociations'; that is, a behaviour usually conceived of as a seamless 'whole' (semantic comprehension, mathematical ability) is discovered to be constituted by several dissociable components. That each cognitive-behavioural act is genuinely distinct is bolstered by the fact that one is retained while the other is lost, often causing the agent to adopt compensatory strategies. For this reason, Marshall and Gurd (2010) state that the field of neuropsychology is "heavily dependent on *theoretical* innovation". Taken by themselves, observations of abnormal behaviour yield little information. However,

when interpreting the double disassociation, the interpreter must ask: *which hidden factor will distinguish between these behaviours*? Merleau-Ponty suggests that, at least in some instances, phenomenology can help make the distinguishing factor more transparent to investigation by showcasing how "compensatory strategies observed in pathological cases" shed light on the "fundamental features of our existence" (Jensen 2009).

From a neuropsychological perspective, double disassociations imply that different neurocognitive sub-systems facilitate different cognitive-behavioural acts. While Merleau-Ponty may not conceptualise the mind as constituted by 'neurocognitive systems', he does believe that correctly interpreting double disassociations will enhance a *phenomenological* understanding of 'mind' and, in turn, differentiating between phenomenological-intentional structures renders the dissociation itself more conceptually transparent.

Thus, Merleau-Ponty intends to demonstrate how an impoverished understanding of intentionality and the importance of global context hinders (classical) neuropsychology's ability to interpret the richness of its own findings. Furthermore, Merleau-Ponty aims to demonstrate how pathological experiences illuminate the general structure of the organism's embodied interrelationship with its world, whereby clinical deviations in this relationship can explicate its general form. Thus, we should be attentive to how Merleau-Ponty utilises the phenomenological method *and* empirical evidence in developing his account.

III. Phenomenological Interpretation of the Body Schema

Chapter 3 of *PoP*: 'The Spatiality of One's Own Body and Motoricity' (pp. 127-212) exemplifies Merleau-Ponty's interpretative neurophenomenological approach.

Throughout, Merleau-Ponty assesses material from empirical neuropsychology via the conceptual prism of phenomenological philosophy. Merleau-Ponty first attempts a reconceptualisation of the so-called ‘body schema’, a notion that conceptually grounds the subsequent case study. The notion of body schema originated in Head and Holmes (1911), where it was defined as a non-conscious postural model. As Merleau-Ponty notes, the construct emerged from analyses of neuropsychological disorder such as allochiria, meaning that ‘body schema’ is best defined as a psychological concept derived from neuropsychological research.

The task taken up by both psychologists and Merleau-Ponty is that of adequately defining the body schema, primarily through argumentation. Merleau-Ponty opens with a general account of embodiment that hinges upon the conceiving the body as a primary, invariant reference point for being-in-the-world:

> If my arm is resting on the table, I never think to say that it is *next* to the ashtray in the same way that the ashtray is next to the telephone. The contour of my body is a border that ordinary spatial relations do not cross. (127)

One’s arm is not ‘next to the ashtray’ because it is never viewed from the vantage point of a detached intelligence that perceives it as one object among many in the visual field. Moreover, the perception of the ashtray is *already influenced* by my having an arm: by virtue of my arm, the ashtray is presented to me as a useful, graspable, *for-something*. Positioning his definition against rival interpretations, Merleau-Ponty then critically assesses what he sees as two competing hypotheses of the body *schema*. Firstly, he critiques the ‘empiricist’ interpretation, which might also be deemed ‘behaviourist’:

> the body schema was thought to develop gradually through childhood [to the] extent that tactile, kinaesthetic and articular contents associated between themselves or with themselves and were thereby recalled more easily (129).

‘Recalled’ is an especially questionable term because it places the intellect centre-stage as the entity that *recalls* previous associations, the contours of which “develop through childhood” because the empirical associations strengthen over time. Merleau-Ponty firmly disputes that body schema is subordinate to the intellect or that the body schema is an emergent property of a ‘sewing-together’ of sensory modalities, which implies that the mind exists as superordinate to the body.

Subsequently, Merleau-Ponty assesses an alternative hypothesis, which, although no longer conceives of the body schema as “the result of mere associations”, still fails to capture the phenomenon in full. This second hypothesis posits the body schema as the “global awareness of my posture in the inter-sensory world, a ‘form’ in Gestalt psychology’s sense of the word” (129). Despite a general affinity with Gestalt psychology, Merleau-Ponty believes that a phenomenology of the body schema highlights a vital piece of the conceptual puzzle that the Gestaltist glosses over. Like the empiricist, the Gestaltist presumes that the body schema’s form is largely static and constrained to the material body’s boundaries, whereas: “the body schema is neither the simple copy nor the global awareness *of the parts* of the body […] rather, the subject *actively integrates the parts according to the organism’s projects*” [emphasis added] (130).

After departing from the erroneous conceptions of the body schema that interpret it as an empirical association of sensory input or a static awareness of position, Merleau-Ponty forwards a phenomenological interpretation. On this account, the body schema’s form is continuously sculpted in relation to the worldly projects that solicit the agent. Merleau-Ponty emphasises that the embodied agent intersects with external world through (or *as*) the bodily schematic, arguing “bodily space and external space form a practical system”, the enactive element of which is particularly

evident when “considering the body in motion because movement is not content with passively undergoing space and time” (132).

Notably, because the body schema is a dynamic phenomenon, it never accentuates all parts of the schematic equally. Thus, our embodied motoricity and spatiality are *situational* instead of merely *positional*; the body does not merely occupy a place in geometric space, nor does it passively receive and store sensory input. Instead, our situationally-driven comportment, elicited by environmental tasks, moulds the body schema according to the task’s demands, establishing a dyadic harmony between body and world. For example, as I type, the parts of my body not orientated toward the goal of writing temporarily rescind (without disappearing entirely) from my bodily-motor schematic. If another body part(s) could replace my hands and achieve the same goal, it might assume an equivalent signification. Moreover, upon perceiving the keyboard, it automatically offers the affordance of something *for-writing*, which (re)shapes my body schema. Body schema is therefore eminently plastic and situational and, like perception, is best understood in conjunction with its intentional-directedness. Thus, Merleau-Ponty summarises his interpretation by stating: “body schema is, in the end, a manner of expressing that my body is in and toward the world” (130).

Thus, the concept ‘body schema’, first supplied by neuropsychology and then refined and reformulated by subsequent psychologists, is further elucidated through the phenomenological lens. Knowingly or not, Merleau-Pont essentially operates as a phenomenologically-orientated psychologist; that is, he presents an established psychological concept, assesses rival definitions of it, and discards those which (he believes) fail to define it adequately before providing his own account. For the neuropsychologist, the model most deserving of loyalty is the one most capable of

the explaining the construct in a satisfactorily way, and Merleau-Ponty's account is acceptable to the extent that it can demonstrably cohere with the construct in question.

In sum, a phenomenological interpretation of the body schema conceives it as neither a bundle of impressions nor a self-contained system isolated from global context. Merleau-Ponty claims that both the empiricist and the Gestalt account failed to distinguish between the 'lived' and 'objective' body by underemphasising how the schema is formed according to situational demands and environmental solicitations. Only after conducting a phenomenological interpretation do two crucial factors become perceptible: 1) that the body schema is not subordinate to reflective consciousness;[4] 2) that it epitomises a dynamic interrelationship between self and world, the shape of which is sculpted according to the tasks that the agent is engaged in.

IV. Merleau-Ponty as Neuropsychologist

Let us now turn to the more difficult task Merleau-Ponty sets himself, the application of the phenomenological lens to a neuropsychological case study. After detailing how a phenomenological interpretation augments an operational definition of the body schema, he progresses onto a lengthy analysis of body schema in 'breakdown'. To achieve this, Merleau-Ponty reinterprets Goldstein and Gelb's (1918; 1923) classic case study on patient 'Schneider', a WW1 veteran who suffered from a shrapnel-induced brain injury located to his occipital lobe and occipital-parietal junction (Mahrotta & Behrman 2004).

[4] Dreyfus (2007a) argues that, when engaged in worldly tasks, anything resembling consciousness or subjectivity dissolves completely.

As discussed, neuropsychological theories are established by astutely inferring cognitive function from cases of pathology, typically those engendered by brain lesions. Abnormalities in the patient's comportment, if interpreted correctly, help to build a more fine-grained picture of the relation between mind and brain that is otherwise concealed in the non-clinical agent's everyday cognitive functioning. In his phenomenological interpretation of Schneider, Merleau-Ponty mirrors this logic, asserting: "let us examine closely a case of *morbid motricity* that lays bare the fundamental relations between the body and space" (133).

Thus, Merleau-Ponty suggests that a sophisticated account of motor-intentional *dysfunction* can shed light on the phenomenon of motor-intentionality generally. Because the blueprint for Merleau-Ponty's investigative schematic resembles that of any other neuropsychological interpretation, the patient's symptomatology is placed centre-stage while Merleau-Ponty's analysis works backwards from its concrete, empirical actuality.

Under a contemporary classification, Schneider's symptoms are listed as: *allochiria* (mis-localisation of sensory stimuli), *autotopagnosia* (mis-localisation of body parts), *apperceptive agnosia* (perceptual defects) and *integrative agnosia*, (the ability to perceive parts but not integrate them into wholes) (Marotta and Behrmann (2004). As is customary in neuropsychology, both a 'third-person' and 'first-person' dimension to the deficit are used to evidence the diagnosis, i.e., the patient's self-reported experiences and observed cognitive-behaivoural pathologies classify a disorder and determine its diagnosis. Merleau-Ponty therefore inherits from Gelb/Goldstein the dual apparatuses (observable behaviour and patient self-report) requisite for formulating a neuropsychological theory. This incorporation of third-person resources is a proto-example of a methodology Dennett (1991) will later call

'heterophenomenology', which he argues bypasses phenomenology's alleged epistemological weaknesses by appeal to publicly-available data.

Which of Schneider's symptoms invite a theoretical explanation? Notably, Schneider cannot point to any part of his body on command nor follow new instructions. Yet, bizarrely, he is fully capable of bringing his hand to the same body-part, or even perform a variety of complex actions, *if* performing a goal-directed action that constituted part of his previous behavioural repertoire. At various points, Goldstein and Gelb categorised these interrelated disassociations into two paired categories. We will first assess the disassociation between *pointing* vs. *grasping* behaviours, introduced in Goldstein (1931). However, this dissociation was seen as a particular case of a more general dissociation (Jensen 2009) between *concrete* vs. *abstract* movement (Goldstein and Gelb 1918). Merleau-Ponty interprets both in his analysis, though sometimes with little signposting as to which.

Clarifying these proposed double disassociations ('pointing and grasping' and 'abstract and concrete movement') will be augmented by including their phenomenological profiles into the interpretative fold. If Merleau-Ponty's I-NP is successful, neuropsychology gains an alternative framework with which to comprehend Schneider's aberrant speech and actions. Simultaneously, if Merleau-Ponty's own phenomenological account successfully finds support in the empirical evidence, we might better justify the claim that I-NP can generate something approximating a neuropsychological theory.

V.i Analysis of Schneider I: Pointing and Grasping

As an interpretive tool, Merleau-Ponty believes that greater attention should be paid to the intentional structure of Schneider's actions (or inactions). Correctly interpreting

Schneider's symptoms is greatly impoverished, Merleau-Ponty believes, if one possesses only a shallow account of their intentional profile(s). Indeed, intentionality is apparently so pivotal to Merleau-Ponty's interpretation that he claims: "if a being is consciousness, it must be nothing other than a fabric of intentions" (153). How then might, on Merleau-Ponty's account, revealing this fabric's intricate structure shed light on the Schneider case?

Merleau-Ponty states that because "the same subject incapable of pointing to a body part" can still touch it if engaging in a goal-directed ('concrete') movement on command, we must "seek the reason behind the privilege enjoyed [only by concrete] movements" (133). The reason remains unclear, argues Merleau-Ponty, due to the deficiencies of "classical psychology [which] does not have any concepts for expressing [certain] varieties of consciousness" (136). Thus, to make sense of the empirical material, Merleau-Ponty must now make the boundaries of these '*varieties* of consciousness' more explicit by revealing and incorporating their intentional structure and rendering their distinctiveness more transparent to investigation.

Motivating such an analysis is that Schneider's symptoms defy a straight-forward anatomical explanation, as no obvious musculoskeletal impediment prevents Schneider from pointing as opposed to grasping. Indeed, Goldstein and Gelb (1918) speculated that grasping and pointing become distinguishable at some undefined *psychological* level. Therefore, articulating an unknown 'psychological' dimension (or: 'variety of consciousness'), is critical to correctly interpreting the pathology. As a phenomenologist, Merleau-Ponty frames Schneider's disassociations as a disruption in his motor-intentional comportment toward world. However, the normative interrelationship existent between agent and world (aspects of which have broken down for Schneider) is not necessarily articulatable with the terminology provided by

the so-called ‘classical model’ of psychology. We are blind as to *why* Schneider cannot perform an action that is anatomically identical to another, Merleau-Ponty claims, unless that explanation incorporates Schneider’s intentional profile.

In his analysis, Merleau-Ponty adopts Husserl’s notion that the objective body (*Korper*), a physical configuration of organic tissue, is phenomenologically distinct from the lived body (*Leib*), the seat of experience. Schneider (in some instances) retains a pre-reflective relation to world via his body-as-*Leib*; that is, his embodied sense of self remains part of an established network of contextually grounded actions. Critically, Schneider’s pathology emerges when he must instead relate to his body-as-*Korper.* Here, Schneider’s intentional-object shifts *away* from a pre-established network of affordances and ‘inward’ toward his own body as located in objective space.

Therefore, whenever Schneider must take *himself* as an object, not some task, breakdown occurs, and the movement becomes impossible. Generally, when the non-clinical agent turns away from pre-established, motor-intentional solicitations and towards their own, objective body, an important intentional shift has taken place. Typically, this shift is imperceptible because it is harmoniously integrated into everyday experience, where the transition is not (necessarily) reflectively registered. However, in neuropsychological breakdown, this difference becomes surface visible whereupon the patient is capable of one but not the other. Schneider can report these symptoms because they developed during adulthood, and so their peculiar, ‘breakdown’ nature are reflectively accessible to him.

Schneider’s inability to point extends to other movements “that are not directed at any actual situation, such as moving [limbs] on command, extending a finger *or*

describing a position of a body part" [emphasis added] (134). For Merleau-Ponty, this observation brings the 'classical' model of embodiment into question: if my body is a static, extant representation of parts, how can I 'know' where my nose is to blow it but somehow 'forget' its location in order to point to it?[5] Once more, the clinical data motivates a reconceptualisation of how we understand human motor-intentionality. Schneider can swat a mosquito from his arm but cannot point to his arm because the former elicits a spontaneous, pre-reflective response and "takes place wholly in the order of the phenomenal world, it does not pass through the objective world" (136).

Schneider has retained a relation to his lived body, albeit in a now distorted, quasi-reflexive sense. By contrast, pointing to one's body *does* takes place in the objective world because it intends one's objective body, which Merleau-Ponty suggests is the most salient distinguishing feature for this disassociation. Thus, the cypher for understanding Schneider's *behavioural* disassociation lies in communicating an *intentional* dissociation. Despite Schneider's disability, "he is [still] his body and his body is a power for a certain world" (137); however, when he must intend his objective body, he no longer engages it as a power for the world. Therefore, one hidden 'variety of consciousness' that renders the symptomatology comprehensible is the discrete intentional profile operative in intending 'world'[6] as opposed to '*Korper*'.

Merleau-Ponty showcases how one pathology that is anatomically or even 'psychologically' unexplainable may be elucidated by sharpening the role of intentionality. Because 'classical' psychology is arguably less attuned to this

[5] Bermudez (2005) tries to retain a representationalist interpretation by claiming that the body representation is something fundamentally non-conceptual.
[6] Or operating with it is as background (Dreyfus 2007a).

intentional dimension than is phenomenology, it struggles to distinguish between two physiologically near identical, yet *intentionally distinct* activities. Despite their superficial similarity, ‘grasping’ and ‘pointing’ feature distinct intentional profiles because, among other features, the former *incorporates Leib* and the latter *intends Korper*. Phenomenological description is thus in a position to *explain*, as neuropsychologists conceive of explanation, Schneider’s double disassociation while remaining within neuropsychology’s epistemological framework.

V.ii The Analysis of Schneider II: Concrete and Abstract Movement

Pointing and grasping is but one instance of the more ‘global’ division between ‘abstract’ and ‘concrete’ movement. Merleau-Ponty accepts Goldstein/Gelb’s claim that Schneider is capable of the latter but not the former. Returning to the distinction between ‘grasping’ and ‘pointing’, because grasping intends a tangible object, its intentional-referent guides the action: the intentional-referent and act-of-intending constitute a unitary phenomenon. Kelly (2002) notes supporting empirical evidence that demonstrated that participants’ hands assume different postures during real grasping motions as opposed to when simply mimicking the action. The definite, goal-directedness of a genuine grasping motion certifies the movement’s end-point as an inseparable component from its inception. By contrast, Schneider cannot break away from the habitual affordances that elicit him and intend the world as a place of *potential* action, an act featuring a very different intentional structure.

If conscious volition alone is sufficient to facilitate all bodily movement, it is difficult to see how Schneider fails to accomplish one action while enacting the same physical movement in another context. Some contextual factor beyond the distinction between *Korper* and *Leib* requires articulation. Accounting for this complex

disassociation leads Merleau-Ponty to introduce the phenomenological notion of projection as an explanatory tool. An improper reading of Merleau-Ponty may lead one to speculate that the importance bestowed to embodiment and environment reduces the role of traditionally 'private' acts such as imagination and planning, which the 'classical model' might assume are contained *within* the individual's psyche. By contrast, Schneider's pathology divulges the intimate co-determination between planning, imagination and acts of world-directed, motor-intentionality.

Indeed, an observable 'breakdown' in the otherwise harmonious relationship between these acts, as witnessed in Schneider, highlight the *importance* of the non-clinical subject's ability to insert themselves into fictitious scenarios and become cognisant of their place within hypothetical contexts. *Projects*, which phenomenologists argue structure the world's presentation to us, depend on an ability *to project*; it is this future-orientated capacity that remains absent in Schneider's being-in-the-world. Schneider is prohibited from being "situated in the virtual" (139) and can only orientate himself towards the actual, while his world seems to move 'by itself' and sweeps up his body along with it. Conversely, the non-clinical agent seamlessly "*reckons* with the possible, which acquires a sort of actuality without leaving behind its place as a possibility" (140). 'Abstract movement' is thus the signifier that one can successfully break with one's pre-established motor repertoire and allow *possible* affording-features to call one to action, so as to complete novel actions.

Further evidence of Schneider's projective deficit manifests in his inability to 'simply' move his arm upwards when requested. To do so, he must first animate his entire body until empirically 'finding' his arm, before 'finding' his head to gain bearing on the direction 'up'. Merleau-Ponty notes that these movements serve to create a kind of

supplementary ‘kinaesthetic background’, a background that is always present for the non-clinical agent, but which requires tedious reconstruction by the patient. Establishing this background is completed via a continuous animation of his entire body until the correct parts become empirically locatable. Only after this series of inferences and calculations may the ‘abstract movement’ be attempted.

Once again adhering to the logic of neuropsychology, Merleau-Ponty suggests that what is always present (yet concealed) for the non-clinical agent becomes transparent when observing its absence in the clinical agent. Schneider’s preparatory movements, necessary for finding a limb or pinpointing a touch, bring the objective body into reflective consciousness, which we learned is problematic for Schneider. Because Schneider lacks constant attunement with his capacity for *projected* motor-intentionality, he must check the position of his limbs like a scientist observing something alien to everyday experience; his body cannot depart from the ‘concrete’ and orient itself towards the nexus of *potential* possibilities through volition alone.[7]

As Dreyfus (2007a) highlights, Schneider has no problem with “inner-horizonal” task switching; say, from cutting a wallet to sewing a wallet. Nor does Schneider face difficulty with the semantic comprehension of the experimenter’s instructions. Rather, the experimenter’s words lack “motor signification” for Schneider: he cannot transfer verbal imperatives onto his lived body because the projective motor-significance of the instructions “no longer speak to him” (141). Thus, for Merleau-Ponty, incorporating the notion of projection into the interpretation means that:

[7] We may even say that the empiricist model of mind closely matches the brain-damaged patient.

> The distinction between abstract and concrete movement is thereby clarified: the background of concrete movement is the given world [whereas] the background of abstract movement is constructed (141).

Merleau-Ponty concludes that concrete action diverges from abstract movement insofar as the latter carves out and establishes a kind of self-sustaining phenomenal background, whereas the former always rests upon a precedent of prior behaviour, a set of motor skills that constitute one's prereflective background-for-action. In Merleau-Ponty's lexicon, abstract movement is "centrifugal" while concrete movement is "centripetal". Whereas concrete movement showcases an established, pre-reflective pattern of engagement that absorbs the body, "abstract movement hollows out a zone of reflection and subjectivity" (142). This 'reflective' aspect of my being-in-the-world somehow separates me from my immediate actuality and enables me first to envisage *how* I will perform a particular action, thus aligning my body with the task before the action is initiated.

Merleau-Ponty's summarises his interpretation of why Schneider lacks the ability direct himself to novel goals thusly: "in order to possess my body independently of all urgent tasks [and] make use of it in my imagination… I must invert the relation between my body and the surroundings" (143). In orienting myself towards an undetermined referent, I interrupt an established system of which I am a part of and seek out an uncharted aspect of the world to take up as reference point. If the patient's condition strips him of the capacity to throw himself into possible worlds, he instead resembles "the status of a thing" (141). The experience of Schneider, claims Merleau-Ponty, is akin to remaining enclosed in a prearranged world, as part of a causal chain, the structure of which was apparently determined by Schneider's pre-injury mode of being-in-the-world. With his 'zone of reflection' absent, Schneider lacks the ability to generate or even obey new goals which, in the normal subject,

would structure the sensorimotor field and allow hypothetical ‘motor signification’ to emerge as a reality. Indeed, this is why Goldstein and Scheerer (1964, p. 8) claim that, for the normal person, “both attitudes are always present in a definite figure-ground relation”.

In summary, Merleau-Ponty’s (neuro)phenomenological reading of Goldstein and Gelb’s case study clarified some previously unclear thematic elements. Phenomenology’s ability to parse apart otherwise concealed “varieties of consciousness” helped to provide a conceptual framework of interpretation positioned to expound Schneider’s perplexing cognitive-behavioural deficits by pivoting to his behaviour’s intentional structure. Furthermore, Merleau-Ponty suggests that the contrast case of pathological motor-intentionality, as provided by Schneider, illuminates motor-intentionality’s more general structure. Namely, the importance of distinguishing between *Korper* and *Leib*, and the importance of projection for normative being-in-the-world, was seemingly evidenced by clinical breakdown rendering their absence or difference salient. As such, we have a persuasive case for the reciprocal relationship between phenomenological description and neuropsychological evidence.

VI. Phenomenology and Science

Summarising Merleau-Ponty’s I-NP approach could assume the propositional form: *Disorder X* appears perplexing through the filter of ‘classical’ psychology; yet, when thrown into relief against a phenomenological background, salient characteristics of the disorder suddenly appear explicable. By implication, Merleau-Ponty believes that phenomenological description can temporarily assume the role of a psychological theory. While this notion may constitute a heresy for orthodox phenomenologists

(Merleau-Ponty himself rarely employs ‘explanation’), we are employing the term ‘explanation’ as used, somewhat uniquely, in the neurosciences. For neuroscience, obtaining a finer-grained description of experience, providing theoretical context to behavioural abnormalities, and disentangling cognitive-behavioural acts from one another all feature significant explanatory value. In *neuropsychology* in particular, revealing the structural differences that distinguish behaviours are a prized asset for the interpretation of evidence.

Of course, Merleau-Ponty’s phenomenology is not slavishly subordinate to empirical psychology, nor is it reduced to being the ‘handmaiden to science’ as per Locke. However, Merleau-Ponty wishes to showcase how psychology and neuropsychology can profit from phenomenology’s sophisticated descriptions of lived experience and how pathological motor-intentionality is revelatory of its non-pathological analogue. Merleau-Ponty articulates this as follows:

> if the description of one’s own body in classical psychology already offered everything necessary to distinguish the body from objects, how did psychologists fail to make this distinction [or] fail in each case to draw any philosophical consequence? (124).

Irrespective of this rhetorical question’s actual answer, our attention should be drawn to Merleau-Ponty’s emphasis on *classical* psychology. Heidegger’s philosophy is never psychological because psychology is an ontic discipline that accumulates facts; its reach extends no further than the ‘being of beings’. By contrast, Merleau-Ponty’s criticism of ‘classical psychology’ remains firmly *within* the standards of psychological discourse. Merleau-Ponty accepts the psychological concept of ‘body schema’ (which is not a phenomenological notion) before adjusting it to, he thinks, better fit the clinical data as reported. Phenomenology was deemed suitable for this role because, as distorted experiences and behaviours constituted the empirical

evidence, the evidence wandered into phenomenological territory. Classical psychology only failed to satisfactorily explain the totality of Schneider's symptoms because it faced an impasse due to its inherited philosophical positions.

Because, in this example of neurophenomenological research, the concrete data guided the interpretation, there is little to distinguish Merleau-Ponty's I-NP approach from conventional (neuro)psychology. Merleau-Ponty's analysis need not make any contribution to neurophysiological knowledge (i.e., greater specificity on the location of the injury) to be considered neuropsychological. Rather, the challenging interpretative work required in describing the cognitive-experiential domain, the explanatory focal point for the patient's symptomatology, is an indispensable component of most neuropsychological evaluations. Explicating Schneider's symptoms required a satisfactory model of consciousness, a feat that is attemptable with several frameworks, all of which must remain tethered to the concrete results (the *explananda*). If some of the data are unexplainable through the classical model, a shift in outlook is justifiable and even embraced.

Nevertheless, psychology's absorption into a phenomenological framework does not necessarily rob it of its status as a psychological investigation and render it 'purely' philosophical. A key principle underlying I-NP is that the empirical data is separable from its conceptual interpretation. Removing phenomenology from the equation does not negate (or support) the experiment's empirical validity. This particular example of phenomenological analysis is entwined with the findings of the Schneider case study: a real person who suffered with a real disorder. Had Schneider's condition happened to be different, Merleau-Ponty's phenomenological interpretation would have been different also. Thus, I-NP is never fully independent of the findings that it interprets.

VII. Contemporary Reception

How has Merleau-Ponty's interpretation of the body schema and the Schneider case study been received by contemporary neuroscience, whether by direct influence or comparative similarity? In the journal *Neuropsychologia,* De Vignemont (2010) cites Merleau-Ponty's work several times when expounding three main criteria for the currently most widely-accepted model of the body schema: '*availability to consciousness*', '*dynamics*', and '*functional role*'. Each component of De Vignemont's tripartite taxonomy appears (at least) broadly consonant with Merleau-Ponty's interpretation. Recall how Merleau-Ponty emphasises that different parts of the body schema emerge and rescind into prominence ('*availability to consciousness*') on the basis of our goal-directed intentionality ('*functional role*') in a plastic fashion that is constantly in dialogue with environmental demands ('*dynamics*').

Gallagher (1986) formalised Merleau-Ponty's amendment of the distinction between *Leib* and *Korper* into the cognitive sciences as 'body schema' and 'body image', respectively. In brief, 'body schema' still designates one's task-directed intentional profile as manifest in the body (*Leib*), while 'body image' (*Korper*) designates an act of intending that takes one's body as its object. Through Gallagher's model, Merleau-Ponty's intentional distinction has been further absorbed into mainstream neuroscience. For instance, in his overview of the 6 major types of body representation, Longo (2016) includes both body image and body schema.[8] Nonetheless, one should be hesitant to declare an unqualified convergence between phenomenological and neuroscientific accounts of the body schema. For instance,

when discussing the body schema, both De Vignemont (2010) and Longo (2008) describe it as sensorimotor *representation.* A phenomenological interlocutor may ask: ‘but who exactly is representing the body’?

Other areas of contemporary neuroscience have made similar use of Merleau-Ponty’s account of motor-intentionality. Gallese (2011) cites Merleau-Ponty’s phenomenology of motor-intentionality as influential to his *embodied simulation* hypothesis and to his interpretation of the function of peripersonal neurons. Berthoz (2000) utilised Merleau-Ponty’s interpretation of the body schema in his neuroscientific account of movement, assimilating it with a Husserlian phenomenology of temporality. In the field of nursing science, insights from Merleau-Ponty’s analysis of Schneider has found practical application to nursing practice with hemi-spatial neglect patients (Klinke, Thorsteinsson, and Jónsdóttir 2014).

However, as Goldstein/Gelb’s case study was one of the earliest instantiations of neuropsychological research, Merleau-Ponty’s heavy reliance on it might introduce further methodological and epistemological concerns. For instance, Goldenberg (2003) has suggested that the original case study contains serious methodological flaws and even that Schneider may have exaggerated some of his symptoms. However, Marotta & Behrman (2004) contest this claim by detailing how Schneider’s conditions are classifiable under a contemporary criterion. Moreover, Laris (1982) and Farah (2004) have noted that other neuropsychological patients with pathologies similar to Schneider’s have adopted comparable compensatory strategies. Therefore, there is little reason to reject the Schneider case study wholesale instead of advising caution in its interpretation.

However, it should also be underlined that, as a project tied to concrete empirical results, I-NP bares little direct blame for the methodological flaws of the material it interprets, no more than computationalism's language of 'memory storage' 'and 'information-processing' are to blame for a study's empirical failings. Even if the empirical study that is interpreted contains empirical flaws, I-NP's investigative *logic* can remain intact. Additionally, as Gallagher (2010) states, contemporary adopters of I-NP should nonetheless seek experimental validation of their interpretations, an opportunity that was apparently unavailable to Merleau-Ponty. Nevertheless, a critic may *still* hold that philosophical analysis is *in principle* ill-suited to the kind of interpretative work required by neuropsychology. Cole (2008) even terms the rash enthusiasm with which philosophers take up cases of neuropathology to justify their claims as the "Schneider problem".

Does Cole's criticism present a damaging blow to phenomenological interpretations of neuropsychopathology? Not quite. In conjunction with Gallagher, Cole himself adopted an I-NP approach to interpret another neuropsychological patient's symptomatology using phenomenological resources (Gallagher and Cole 1995). This study utilised and refined the distinction between body image and body schema in the study of patient I.W, who suffered from a severe proprioceptive deficit. Among other hypotheses, Gallagher and Cole suggested that I.W substituted his body image, "in a partial and imperfect way" for his body schema. Thus, even critics of particular instantiations of philosophical neuropsychology have deemed it possible to explain clinical evidence from within a phenomenological framework.

VIII. Conclusion

In sum, I-NP showcases the ability of phenomenology to relay the 'cognitive-experiential' dimension, when such a function is explicitly required, by utilising a particular language to filter empirical findings according to a conceptual prism. Indeed, key elements of Merleau-Ponty's interpretation are expressible as hypotheses and, as such, are susceptible to falsification or alteration in the face of conflicting empirical evidence. If a future patient who shares Schneider's diagnoses retains, for example, the projective function, or uses a different strategy to compensate for its deficit, the interpretation must be altered to incorporate this new data.

The case example discussed here showcased how a set of established empirical findings profited from a focused phenomenological interpretation. The psychological construct 'body schema' and clinical examples of double disassociation were interpreted, with at least partial success, through conceptual tools supplied by phenomenology. With regards the latter endeavour, symptoms were explained by appealing to an underlying phenomenological difference which, when made explicit, rendered the double disassociation more comprehensible. Meanwhile, Merleau-Ponty's phenomenological account of motor-intentionality was crafted in dialogue with explicitly psychological concepts and clinical findings, suggesting that phenomenological inquiry can attempt to evidence its claims with empirical resources.

The contemporary reception of Merleau-Ponty's interpretation can be compared with analogous theories from the mid-forties. Aspects of Merleau-Ponty's research may require tweaking, or modification in light of newer discoveries, yet several weaknesses are attributable to the state of the art at the time (Gallagher 2010). This qualification may be a distinguishing factor between phenomenology and

neurophenomenology. That is, any flaws in Husserlian phenomenology are completely unrelated to methodological flaws in scientific psychology. However, as empirical evidence assumes a lead role in I-NP, the interpretation's validity is, like any psychological theory, always dependent on the data's validity, as the specificities I-NP's research output approach is heavily contingent on the data interpreted.

Chapter 2. Experimental Neurophenomenology: Epilepsy

I. Introduction

In the last chapter, we saw how emphasising the subject's intentional orientation elucidated otherwise unclear empirical findings. One possible contribution proffered by the neurophenomenological approach is that of grounding 'mental events' against a meaning-conferring background. Such a step contributes toward mitigating a recurrent epistemological problem in scientific psychology; namely, that meaning and context are eliminated in experimental studies, yet their inclusion would otherwise have positively informed the interpretation of empirical evidence (Iacaboni 2006). The phenomenologist may further argue that redefining experience as an 'experimental variable' diminishes the value of its inclusion, as its ability to provide qualitative evidence is impaired.

Nonetheless, the separation of a portion of experience from its global context may be necessary and unavoidable in certain cases. A research topic may be especially amenable to experimental investigation if the demarcation of a mental event is important, relatively straightforward, or its occurrence is otherwise rare or pathological. This demarcation is particularly crucial in neuroimaging experiments, where success is dependent on segregating a specific network of neural activity *and* its specific cognitive-experiential correlate. Part of this chapter's purpose is to analyse a research initiative where a class of experiences and their neural correlate seemingly profited from application of the experimental method.

Thus, neurophenomenology is not limited to contextualising empirical discoveries by translating them ad-hoc through phenomenology's well-tuned hermeneutical lens;

rather, it can ingratiate itself into the experimental design at a foundational level through the framing and modifying of data collection and data analysis. Experimental neurophenomenology (E-NP), as pioneered by Lutz and Thompson's (2003) study of the anticipatory features of visual perception, generates novel data in accordance with the epistemological standards of a cognitive neuroscientific experiment. When evaluating this approach, we should be cognisant that the success of any experimental design is firmly conditional on the results obtained. However, E-NP is subject to an additional condition in that it must retain its right to be called a *phenomenological* approach.

To productively adapt phenomenology to the experimental setting, some theoretical sacrifices and compromises are required. In E-NP's experimental protocol, the Husserlian *epoché* is rehabilitated from its function of revealing the transcendental characteristics of phenomena and repurposed as a means of 'measuring' otherwise opaque dimensions of experience. Correspondingly, these newly obtained descriptions must be repackaged as (and some may say reduced to) 'subjective data', to complement the 'objective data' supplied via neuroimaging. Experimental neurophenomenology thus seeks to correlate two datasets, neurophysiological and phenomenological, that together will characterise a circumscribed 'neuro-experiential event'. E-NP must explicitly designate a zone of inquiry where recognisable expressions of both experience and neurophysiological activity are specifiable and that simultaneously stand to benefit from the application of the experimental method and its logic of isolation and correlation.

To investigate this approach further, we will turn to a research initiative that seemingly profited from an E-NP approach: a series of studies conducted by research teams led by Varela (2001), Le Van Queyen (2003) and Petitmengin

(2006), sometimes referred to collectively as ‘the Paris group’. Over several years, these researchers applied neuroscientific and phenomenological research techniques to disclose previously unknown neurological and experiential markers of epilepsy. Petitmengin (2009) provides a metareview of their collective efforts which will serve as the primary reference-point for the present analysis. These studies are viewed as exemplifying the E-NP approach, predominately through recourse to the concrete, experimental results that were obtained and their subsequent application.

II. Epilepsy

Epilepsy is a serious and chronic neurological disorder affecting approximately 1% of the population. It is characterised by temporary and unpredictable cerebral hyperactivity that manifests in the form of an epileptic seizure. An epileptic seizure’s full duration persists from seconds to minutes but never exceeds five minutes. Typically, the seizure begins in one neural area (the ‘epileptic focus’) before spreading out to other regions or, in severe cases, the entire brain (Petitmengin 2009). Prior to advances made in the last two decades, detecting any indicative modifications in brain or behaviour prior to seizure onset proved challenging. Imaging the seizure itself was possible (typically by using electrodes placed inside the cranium) but any distinguishable pattern of activity leading up to seizure onset was largely imperceptible.

A series of interconnected studies, beginning with Mormann et al. (2000) and culminating with Petitmengin’s (2009) metareview, aimed to disclose the full ‘life-cycle’ of a seizure as an interrelated neurological and experiential phenomenon. To succeed, the Paris group needed to establish a correlation between *both* dimensions of the designated ‘neuro-experiential event’. Initially, they found a distinct pattern of

previously unclassified neural activity that emerges immediately before seizure onset. This period of activity was chosen as the focus for a follow-up study that sought to correlate it with a commensurate phenomenological profile.

This research initiative displays a simple yet potentially pioneering investigative logic. Firstly, the neurological reality of an object of inquiry is confirmed: in this case, the preictal stage of a seizure. This satisfies an initial neuroscientific evidential standard that the entity under investigation is real, or using Bhaskar's (1978) categorisation of scientific phenomena, 'actual'. Thereafter, this neurological profile must be accurately matched with a phenomenological profile by training participants to achieve greater awareness of how this stage manifests in experience.

Some initial caveats require articulation regarding the ability to generalise this specific research to neurophenomenology as a whole. Firstly, the phenomenological canon is beset with claims that phenomenal experience is either not caused by, too complex for, or categorically distinct from anything happening in the brain, meaning that establishing any such correlation features little merit. Furthermore, we should be hesitant to suggest that all neurological activity can be transferred into reflective awareness and thus made describable; countless neurological processes will likely remain forever experientially inaccessible.

However, *if* promotion from a low-grade picture of an intentional-object or act-of-intending into a high-grade picture is indeed possible and necessary for a neuroscientific study, we should consider E-NP's methodological approach as a major contender for its realisation. Indeed, the specific research initiative evaluated here is exemplary because it seems well-suited to the pragmatic motivations enshrined in clinical research. Namely, epileptic patients who successfully achieve

greater awareness of experiential indicators of an imminent seizure are consequently better equipped to take beneficial or even life-saving actions to protect themselves from harmful consequences.

III. Establishing the Neurological Profile

The turn of the 21st century brought with it several advances in neuroimaging; included therein was the ability to detect the neurological profile of an onset epileptic seizure (Mormann et al. 2000; Varela et al. 2001). This development was accomplished with the 'neuro-dynamic' model, which permits the mapping of spatially disparate brain regions whenever these regions coalesce into a singular neural event (i.e., an epileptic seizure). The underlying hypothesis runs that a neuro-experiential event does not correspond directly to any *singular* brain area but emerges from a distinct pattern of activity distributed across several regions at a global scale. A neuro-experiential event is neither caused *by* nor correlated *with* one isolated neural region but rather with several neural populations activating in a unique configuration. Upon synchronising into a 'phase-relationship', the rhythms emitted by these neural populations are identifiable using neuroimaging (Lachaux et al., 1999).

The neuro-dynamic method therefore modelled the epileptic seizure as an event characterised by several such phase-relationships (Petitmengin 2009). At first glance, this achievement appears to derive exclusively from technological developments. However, its success is perhaps equally enabled by developments in conceptual sophistication. The theoretical model of brain organisation defined by circular causality, as propagated in neuro-dynamics, matured alongside with, and under the influence of, phenomenological philosophy (Varela et al. 2001; Freeman

2001). Neuro-dynamics conceives the brain as “self-producing and involved in a continuous sensorimotor dynamic [with the] environment” (Rudrauf et al. 2003). Indeed, the neuro-dynamic model exemplifies the influence of nonlinear dynamic systems (Port and van Gelder 1995) in the cognitive sciences, which Gallagher and Zahavi (2012) note is an integral element of (experimental) neurophenomenology.

In light of this, Petitmengin (2009) opposes an unqualified conceptual commitment to linear causality and computationalism in the neurosciences, claiming that the “neuronal dynamic is not organised in sequential order, as the ‘computer’ metaphor would have it”. ‘The computer metaphor’ apparently denotes the philosophical notion that the minded brain shares ontological features or status with a computing machine. To avoid the purported conceptual blind-alley of equating the brain with a fleshy computer, Petitmengin instead opts for the “orchestra” as her metaphor of choice, emphasising holism and dynamism over reductionism. Therefore, since further discussion of the neuro-dynamic method is not possible here, suffice it to say that it shares several philosophical assumptions with phenomenology.

Which concrete empirical results emerged from application of the neuro-dynamic method to epilepsy? Through intra-cranial EEG recordings, the neuro-dynamic model revealed several synchronised patterns of neural activity that constitute the ‘life-cycle’ of an epileptic seizure. The stages are sub-dividable into three categories: ‘ictal’, ‘interictal’ and ‘preictal’ (Le Van Quyen et al., 2001b; Varela et al., 2001). This picture can be simplified by viewing the ‘ictal’ phase as the epileptic seizure itself, the ‘preictal’ phase as the period building toward the seizure and the ‘interictal’ stage as the intermittence between normal cerebral activity and seizure onset.

Varela et al. (2001) demonstrated that the preictal phase occurrent immediately before a seizure is identifiable by a particular pattern of abnormal communication across neural populations. Among the eight epileptic patients studied, Varela et al. (2001) found that, in 77% of the seizures, “a decrease in synchronisation of the neuronal populations surrounding the epileptic focus is observed within the 10-25 Hz range […] 5 minutes prior to the seizure onset”. This relationship is known as ‘phase-scattering’.

By contrast, the ictal stage (seizure onset) featured a “*higher* synchronisation of neurons surrounding the epileptic focus” whereby the epileptic focus is “isolated from the rest of the brain” in terms of global, interacting connections. Thus, during the preictal stage, there is an *decreased* neural synchronisation surrounding the epileptic focus. Conversely, during the ictal (seizure) stage, there is a *increased* synchronisation (**see fig. 1**). Evidence gained from these recordings indicates that “the seizure does not arise suddenly, [there] is a transition from the interictal to the preictal state” and that “a seizure does not correspond to a precise area of the brain, but to deficient functioning of neural networks, related by abnormally facilitated

connections" (Petitmengin 2009).

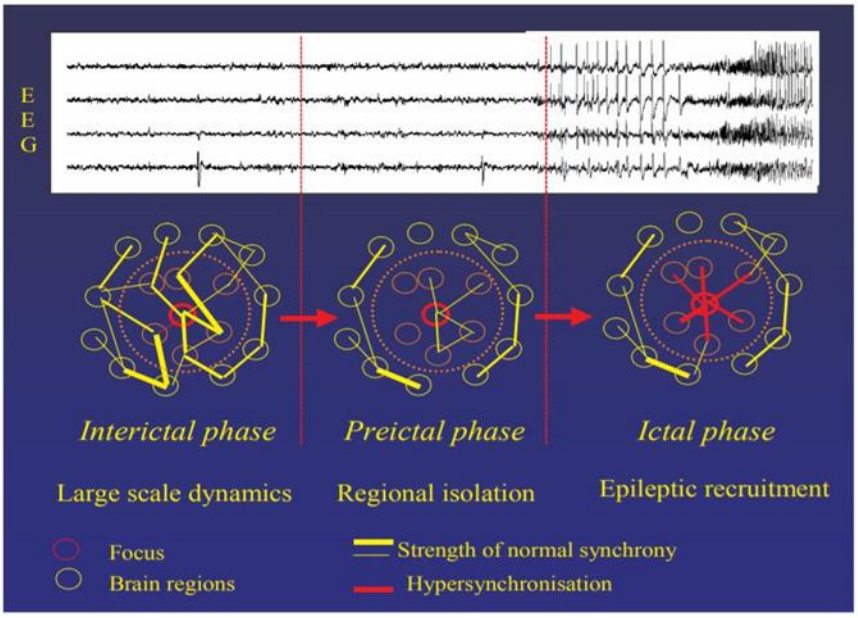

Figure 1: The dynamics of neuronal synchronisations before and during a seizure

Petitmengin then notes that this data fails to "tell us anything about the way this transition is felt by the patient". This would beg the question as to whether there existed an experiential profile that correlated with the neurological profile. Could this transitional phase (the 'preictal stage' preceding the seizure) be made experientially transparent and, if so, through which tools? Furthermore, if successful, the pairing of novel phenomenological and neurological data could establish a template for E-NP research generally. That is, newly-discovered patterns of neurological activity could point to as yet unreported dimensions of phenomenal experience, and vice versa. Under this paradigm, neuroscientists are not solely reliant on existing, folk-psychological descriptions of experience, but can implement a procedure specifically designed to *discover* a neurophysiological finding's 'experiential correlate'.

IV. The *Epoché* as Qualitative Measure

Despite the technical impressiveness of mapping the preictal stage's neurological profile, this achievement confers little practical benefit for epileptic patients. The

impetus driving clinical research stipulates that success is often best evidenced by enabling patients to better manage their illnesses. Under most circumstances, epileptic patients will not be connected to intracranial recording equipment in a clinical environment. Therefore, maximising the clinical utility of the preictal stage's identification necessitates that the neurological findings are 'cashed in' in first-person terms.

Importantly, experiential descriptions characteristic of the preictal stage had seemingly not emerged in everyday language among epileptic patients. Yet, with the preictal stage established as a neurophysiological 'reality', it became justifiable to hypothesise the existence of an experiential correlate. The contribution of phenomenological resources to this initiative was as a means of accessing and measuring this otherwise unarticulated domain of experience.

Prior investigations into the then-unclassified preictal stage (termed 'prodromes' or simply 'warning symptoms') were measured with the use of questionnaires. However, questionnaires often feature an impoverished descriptive value for conveying certain kinds of first-person experience, as questions are prewritten without patient input, and the answers must undergo quantification. While the questionnaire may be adequate for reporting the subject's *explicit* beliefs and opinions, it is often less effective for capturing the more intricate details of experience. The interview method, while more time-intensive, is perceived as providing a higher level of qualitative precision when properly applied (Haslam and McGarty 2014). In pursuit of an adequate qualitative measure of preictal experience, Petitmengin et al. (2006) employed semi-structured interviews of a 90-minute duration that operationalised the 'phenomenological reduction' (*epoché*) as a method for data-collection.

While E-NP's success is predominately anchored to the significance of its empirical results, it faces an additional hurdle regarding its employment of phenomenological terminology. Specifically, the neurophenomenologist must substantiate their adoption of the 'phenomenological reduction' or '*epoché*'. The inevitable controversies surrounding the multiple definitions of the *epoché(s)* are outside the scope of the present discussion. However, it is important to briefly evaluate the compatibility between neurophenomenology's operationalised *epoché* and Husserl's employment of the term. For neurophenomenology to successfully adopt the *epoché* it must, on the one hand, demonstrate (at least) a passing resemblance to Husserl's method and, on the other, distinguish itself as an empirically useful qualitative measure.

Husserl developed the *epoché* in the service of uncovering an epistemological grounding for philosophy and later as a professed 'science of essences' (Zahavi 2003). The purpose of the *epoché* was not, as Husserl ceaselessly emphasised, to reveal the fleeting contents of consciousness. Husserl (1913/2012) explained that the *epoché* pursues the "goal [of] winning a new region of Being…(p.55), which shows things "transcendentally purified in regard to the way in which we apprehend [them]" (p. 97).

To determine whether both the Husserlian and experimental *epoché* might constitute a single *genus*, we will concentrate on two of the ***epoché's*** central features as outlined by Husserl. The first pertains to the aforementioned goal of "winning" an otherwise absent region of phenomenal experience through adopting a particular methodology. The second relates to the value-judgement that this newly obtained information is somehow "purified" (though without reference to the transcendental realm that interests Husserl).

A shortcoming in Petitmengin's (2009) meta-review is the investigative work required to clarify the experimental *epoché's* methodological specificities and theoretical foundations. However, elsewhere Petitmengin et al. (2006) identifies the techniques pioneered by Lutz and Thompson (2003) as determinate of her methodology. In their study of visual perception, Lutz and Thompson implemented the *epoché* to "mobilize and intensify the tacit self-awareness of experience by inducing an explicit attitude of attentive self-awareness". They trained participants to implement the operationalised reduction as objects were displayed on a screen to acquire "detailed first-person descriptions of the categorical features of experience" with regards to the subject's anticipation of the object's appearance.

Three categories of 'perceptual readiness' emerged from the participant's reports. These novel categories were then correlated with data from simultaneous EEG recordings. The crucial take away from this study was that the reported descriptions of anticipatory experience correlated with otherwise undefined patterns of neurophysiological activity. Measurable patterns of activity in the neuroimaging (EEG) data, having no clear cognitive-experiential correlate, would have otherwise been ignored as 'noise'. Thus, *epoché*-acquired profiles of experience promoted the detection of novel patterns of neural activity. The *epoché* is thus defensible on the grounds that, as features of experience are not necessarily transparent to the agent, and patterns of EEG data not necessarily transparent to investigators, both are potentially retrievable upon application of the correct experimental measure.

At the level of *praxis*, Depraz (1999; 2000) identified structural commonalities that supposedly underlie several variations of the *epoché,* in part to explicitly provide philosophical support for neurophenomenology (Varela, Depraz and Vermersch 1999). According to Depraz (1999), there exist three 'ways' into the reduction: '*the*

Cartesian way', '*the psychological way'* and '*the way of the life-word'*. It is the second category that interests us here. The *psychological way* is "proper to the phenomenological psychologist" though it "obliterates the radical, transcendental concern" determinative of the transcendental approach. Under the psychological reduction, the agent engages in an "attentive observation" whereby salient features of a circumscribed intentional-object become increasingly transparent to reflective consciousness. Whereas the transcendental reduction often explicates the structure of the act-of-intending, the psychological reduction is content to, if necessary, delimit its interest to the object(s) of experience.[9]

Furthermore, Depraz et al. (2000) forward a tripartite structure of the *epoché* that ostensibly scaffolds most of its possible implementations: *Suspension, Redirection* and *Receptivity*. With regards the psychological reduction, this procedure involves an initial *suspension* of the irrelevant elements contained in the flow of experience followed by a deliberate *redirection* toward the intentional-object pertinent to the investigation. This procedure is purported to heighten *receptivity* to otherwise concealed elements of experience engendered by the intentional-object. To clarify what "attentive observation" denotes, Depraz (1999) elicits Husserl's notion of *affection*. Purportedly, *affection* bypasses the dichotomy between engaged, active attention and receptive, passive attention. In a state of *affection,* the agent's attention is not merely *elicited* by an existent phenomenon but rather it phenomenologically *interrogates* it.

While Husserl's transcendental *epoché* is committed to liberation from metaphysical and scientific presuppositions, the experimental *epoché* is not particularly wedded to

[9] However, Lutz and Thompson (2003) claim to showcase how the *epoché* may disclose structural elements of intending-acts.

this feature outside of ‘bracketing’ irrelevant first-person data, such as the patient’s dislike of their medical condition or simultaneous desire for a cup of coffee. Agents can intend an object in (for our purposes here) two broadly-defined ways: as a theoretical construct or how it is given in immediate experience. In both cases, the intentional act ‘interrogates’ the intentional-object (i.e., the preictal stage).

In this study, the patient must actively orient their attention toward experiences given immediately *by* the preictal stage and not towards secondary, derivative features of it (such as a theory about what the preictal stage is). Again, E-NP is uninterested in recording how the participant experiences the object at the levels of belief, opinion or theory. Rather, what interests the experimenters is how to expand the participant’s awareness of experiences that characterise the intentional-object at a largely pre-reflective level.

However, this endeavour requires assistance from a trained experimenter. The neurophenomenologist holds that participants are neither infallible in their ability to report their experiences (Lutz and Thompson 2003) nor capable of independently maintaining the *epoché* for lengthy periods (Depraz 1999). Indeed, Depraz notes that, as an ultimately embodied and temporally-situated act, the *epoché* is difficult to sustain for any protracted length of time. As such, the experimenter plays a vital role in guiding the subject’s maintenance of the *epoché*, continually redirecting their attention toward the selected intentional-object when necessary (see below). We might therefore label the measure employed in E-NP as a *hetero*phenomenological reduction.

In (very) simplified terms, the experimental *epoché’s* primary function is to make otherwise dormant experiences reflectively accessible. E-NP operationalises this

feature as a means of *data-generation* whereby descriptions of phenomenal experience are newly available on both a first-person and third-person basis. That is, the epileptic patient first gains awareness of a field of otherwise concealed preictal experiences and can subsequently report them to the experimenter. An obvious criticism may here point to the epistemological fragility of first-person data. However, this facet is not unique to neurophenomenology; cognitive neuroscience readily admits of experiential correlates to distinct patterns of neural activity, yet often may simply borrow its descriptions from their folk-psychological usage.

Defenders of neurophenomenology might therefore respond that the *epoché* delivers qualitative data of a greater descriptive accuracy *and* amenability to experimental manipulations. Indeed, Zahavi (2003) argues that "replacing non-scientific (in this case, folk psychological) concepts to guide our experiments, increases the amount of control cognitive scientists can use to frame their explananda". This facet is particularly useful when novel patterns of neural activity (*without* a pre-established experiential correlate) are discovered, as the *epoché* can attempt to articulate their experiential correlate where none have been reported in folk-psychological terms thus far.

With these points in mind, the operationalised ***epoché's*** employment in lieu of alternative measures is perhaps easier to justify. As a qualitative measure, the *epoché* represents a unique way of measuring a targeted zone of phenomenal experience. Through its structural components of *suspension*, *redirection* and *receptivity* (Depraz 2000), the *epoché* possesses an approximate guideline for collecting unique forms of data. Simultaneously, the *epoché* can perform the

additional function of removing experiential 'confound variables': the extraneous variables which corrupt the data through accidental inclusion.[10]

Following this analogy, the *epoché* helps to filter out the unwanted grains of irrelevant phenomena (the confounds), leaving a supposedly 'purified' version of the experience for the experimenters to measure. If successful, the experimenters obtain a categorical set of experiences (e.g., those unique only to the preictal stage of a seizure) instead of experiences that simply happen to co-occur within the same timeframe. Consequently, this 'purified' experiential data has superior value as a correlate of the neuroimaging data, which has its own procedures for the elimination of confounds.

A pertinent example of a confounding factor that might contaminate the phenomenological data assessed here relates to the patients' fears that reliving a seizure will provoke another. This is no mere superstition: Navarro et al. (2006) found that remembering a past seizure can indeed cause another to reoccur. But such experiences of 'fear' or 'apprehension' do not represent facets of direct preictal experience of the kind targeted by the experimental *epoché*. Even if these mental states *intend* a seizure, they are nonetheless directed towards the *hypothetical possibility* that another seizure might occur. As such, we might say they are *secondary*, not *primary* expressions of the preictal stage; on this basis, they are candidates for removal. Therefore, it is precisely in this sense that the experimental *epoché* might to said to reveal the so-called 'essential characteristics' of the phenomenon under investigation.

[10] An analogue from medical biology would be disaggregating alcohol abuse from a study on the genetic basis of liver disease.

V. The Phenomenological Data

In acquiring the phenomenological data, the Paris group had to avoid contaminating the patients' reports through use of leading questions. They navigated this dilemma by asking strictly open-ended questions, such as "what sensations do you remember during this period?". Moreover, the experimenters induced a degree of contextual awareness in the patients, asking them to relive "the spatio-temporal context of the experience: (when, where with whom?)". However, this instruction simply serves to reignite the patient's memory, not to contextualise their experiences within an ecological background of meaning.

Indeed, this factor leads directly onto a significant methodological problematic of the study. Namely, that the phenomenological data were retrieved from the patient's memories. This problem is not incurred in other neurophenomenological experiments, and the simplest explanation for its occurrence here is the unavoidability of conducting the research immediately prior to a real seizure. Nonetheless, critics can point to an unescapably sharp phenomenological distinction between immediate experience and experience as recalled through memory. Husserl himself attributed substantial importance to this distinction (Brough 1975).

One possible escape route for this conundrum sidesteps the problem by an appeal to the epistemological standards operative in empirical neuroscience. The goal of obtaining a robust set of results entails that a neuroscientific experiment is less concerned with establishing universal laws (or essences) than in accumulating empirical facts of localised truth-value for pragmatic ends. Arguably, an unavoidable compromise in phenomenological accuracy is permissible if it renders the experiment practically viable and delivers scientifically valid results. As long as the

epoché can be said to measure the phenomenon it claims to measure (i.e., 'measurement validity'), the fact that participants accessed their experiences via memory does not invalidate the study's findings on a scientific basis. As such, this branch of neurophenomenology is perhaps better judged on empirical rather than philosophical grounds.

At this juncture, we should review the phenomenological findings obtained and their relationship with the EEG data. Like a physician, the neurophenomenological experimenter attends to both the patient's verbal *and* non-verbal cues as potential indicators of unacknowledged features of (preictal) experience. These include speech content, gaze direction and bodily gestures. For example, when one patient was questioned as to why she repeatedly touched her forehead, she reported the experience of a "slight touch, like a breeze touching my forehead" which would indicate an impending seizure. Another patient verbally recalled a sensation of 'heat' that began in the stomach before spreading throughout the body. One patient noted a more general feeling of depression before seizure onset, while another reported feeling "ill at ease".[11]

The reported experiences were sub-divided into three categories: *synchronic, diachronic* and *functional.* Experiential invariances were codified for the purpose of extracting an essential feature of the experience. Here, one epistemological feature of phenomenology arguably makes for a bedfellow with neuroscientific practice. Specifically, that phenomenology aims to disclose "essential, organizing patterns" of experience (Parnas and Bovet, 1995) rather than its fleeting 'contents'. Likewise, the cognitive neuroscientist aims to establish a firmly consistent relationship between

[11] This procedure was replicated to target experiences characteristic of the seizure itself, though these findings are not relevant here.

brain organisation and cognition-experience. Thus, Petitmengin (2009) translates individual descriptions of experience into signifiers of categories: “I am looking at the scene with my own eyes” becomes “*first-person perceptual position*”; “that morning I felt fragile” becomes “*negative internal state*”. As categorical experiences, these experiences can be said to *categorise* the preictal stage at the phenomenological level.

Subsequent to categorisation, it was demonstrated that, while ictal experiences were experientially ‘positive’ in character (i.e., motor, sensory or verbal ***hyper***-activity), *pre*ictal experiences were ‘negative’ in character, associating with ***reduced*** energy, vitality, language ability, concentration or balance. The most commonly reported experiences associated with the preictal stage were “tiredness”, “weakness”, “lack of energy” and “fragility” (*n*=4). The second most commonly described was distress (*n*=3). Of less reported frequency were “headaches”, “clumsiness” and “hypersensitivity to light” (*n*=2). These data supported the conclusion that the decrease in phase synchrony (desynchronisation) that characterises the preictal stage as a neurological event has ‘negative’ experiences as its experiential correlate. By contrast, the ’positive’ and sudden character of the experiences related to the seizure itself (‘ictal stage’) corresponded with neurophysiological *hyper*-synchronisation.

The central research question: “do the neuro-electric preictal modifications identified among epileptic patients correspond to modifications in their subjective experience?” was seemingly answerable in the affirmative. The neuro-dynamic and phenomenological methods employed permitted a correlation between ‘objective’ and ‘subjective’ datasets. But on which plane can a correlation be established? Northoff (2015) asserts that spatio-temporality can serve as ‘common currency’

between the phenomenal and the neurological domains. A philosophically modest but pragmatic interpretation of this dictum holds that both experiential and neurophysiological data can be chronometrically aligned. In other words, it is justifiable to hypothesise that when invariant experiential profiles and invariant neurophysiological profiles arise and withdraw in synchronisation, they can be judged as related in some capacity. One of the most striking empirical findings garnered by applying this logic to both datasets was that events at the phenomenological and neurological levels appeared to be temporally mismatched:

> the decrease of neuronal synchronisation occurs a *few minutes* before the seizure, whereas the state of fragility that seems to characterise the preictal period is felt *several hours* before the seizure (Petitmengin 2009).

Seemingly, the preictal stage's characteristically 'negative' experiential profile preceded its neurological counterpart by a significant margin. This temporal mismatch contained useful implications for further investigative work; specifically, it indicated that the neuroimaging component of the study should expand the frontier of its timeline in line with the phenomenological data.

Thus, a sample of five patients who had already been subject to 24h EEG recordings, for a collective accumulation of 305 hours, had their EEG recordings reanalysed on a broader timescale. Within this timespan, 50 separate seizures were evaluated. In support of the phenomenological findings, it was subsequently found that distinctive neurophysiological markers of the preictal stage were detectable five *hours* before seizure onset, not five minutes as originally hypothesised. It was observed that the neuronal populations surrounding the epileptic focus underwent their characteristic process of desynchronisation significantly earlier than the

neuroimaging work had initially shown (Le Van Queyen et al. 2005). Thus, the phenomenological markers of the preictal stage, obtained by the experimental *epoché*, enabled the researchers to detect commensurate neurological markers long before they were initially assumed to have emerged.

VI. Scientific Implications

Haslam and McGarty (2014) provide four criteria according to which all psychological experiments are allegedly assessable: *description, prediction, explanation*, and *application*. The case for the experiments assessed here featuring *descriptive* value in their obtainment of novel phenomenological and neurophysiological profiles is largely self-evident. However, the *explanatory* significance (and specific *explanandum*) of a neurophenomenological experiment is less transparent. What exactly does an E-NP design endeavour to explain? Assuming a (controversial) naturalistic position, preictal experience (e.g., 'fragility') can be explained through recourse to preictal neurological desynchronisation: the neurological activity *causes* the experience.

Notwithstanding the phenomenological impasse inherent to introducing causality (see below), 'explaining' preictal experience was hardly a motivating factor to begin with; through the neuro-dynamic method, Le Van Quyen et al. (2001b) only discovered the preictal stage due to a broader initiative aimed at improving the early detectability of epileptic seizures. Disclosing the preictal stage's experiential correlate was predominately in service of alerting patients to an imminent seizure and helping clinicians in developing effective countermeasures. This pursuit was

essentially open-ended and therefore no causal hypothesis required any confirmation. Moreover, unlike other neuroscientific experiments, the specific relationship between brain and experience under investigation was not amenable to experimental influence. Neither preictal experience nor neural activity were manipulated, so the experiment measured each profile as it occurred without much interference.

Therefore, the series of studies assessed in Petitmengin's (2009) meta-review perhaps perform best if they are graded under the criteria of '*prediction'* and '*application*'. Predictive validity denotes a type of 'external' validity that is satisfied whereupon experimental findings facilitate a prediction that is both accurate and theoretically consistent with the original results. If the original results are robust, theoretical analysis can mould the data into further avenues of (testable) speculation.

In this instance, an empirically testable prediction was proposed that the neurophysiological process of preictal desynchronisation would emerge earlier than five minutes before seizure onset. Supporting this speculation was that discovery that preictal *experiences* reportedly emerged several hours before seizure onset. Thus, a discovery at the *phenomenological* level accurately predicted a subsequent discovery at the *neurophysiological* level.

This prediction's subsequent experimental confirmation bolsters the purported (local) association between preictal experience and preictal desynchronisation and, on a broader plane, the global association between neurophysiological data and the kind of experience captured by the experimental *epoché.* Further supporting evidence arrived by way of the seemingly successful application of the Paris group's findings to the development of therapeutic interventions. Recall that a primary motivation

behind their inquiry was that of conferring to patients an enhanced ability for recognising an impending seizure through optimising patient's awareness of experiences characteristic of its preceding preictal stage. Petitmengin (2009) notes that "refined interview techniques" designed to guide patients towards the recognition of an approaching seizure were developed from the neurophenomenological data. Additionally, biofeedback devices that "facilitate the awareness of premonitory sensations and the setting up of counter-measures" were also developed (Nagai 2014).

Finally, two interrelated criticisms on scientific grounds should be highlighted. The first weakness relates to the study's small sample size. The initial sample size for the phenomenological component of the study included 9 participants. As three patients failed to reliably recall preictal experiences, the investigation was limited to an even smaller sample size of 6. While this number is far below the recommended minimum of n=22 for a within-subject experimental design (Baker et al. 2020), such a small sample size is not unusual for investigations that are unable to draw upon the normal population. Baker et al. recommend that to mitigate this weakness, such studies should increase their number of trials, which is presumably why Petitmengin (2009) interviewed all subjects "at least twice".

A second, related consideration concerns the fact that there has not yet been an attempt to replicate the full spectrum of experimental procedures reviewed in Petitmengin (2009). The most likely reason for this is that the procedures implemented are theoretically and practically complicated and took many years and several researchers for them to come to fruition. As the name suggests, intracranial recordings necessitate that electrodes are placed inside the patient's skull, which

entails a surgical procedure. This practice is subject to incredibly stringent ethical guidelines (Sahuhquillo & Biestro 2014).

Thus, any full replication of the neurophenomenological findings would first entail a lengthy neuro-dynamic analysis to confirm the preictal stage before finding several patients who were willing to undergo a lengthy and invasive procedure. Though the difficulty with which the results were obtained is perhaps deserving of praise, experimental neurophenomenologists should, where possible, aim to make their studies as easy to replicate as possible, to avoid E-NP being something of an insular practice.

VII. Phenomenological Implications

The experimental *epoché* is susceptible for criticism on phenomenological grounds insofar as the phenomenological data were taken from experiences as recalled via memory. However, this feature is not emblematic of E-NP generally and was instituted based on factors unique to epilepsy. Extracting qualitative data from patients for whom an epileptic seizure is imminent is extraordinarily difficult; seizures often arrive unexpectedly, and patients may understandably wish to take precautionary measures rather than partake in data-collection.

Nonetheless, even attempts to ground phenomenology in mathematics maintain a fundamental distinction between immediate experience and remembered experience (Roy et al. 1999). The act of remembering *previously* immediate, pre-reflective experiences, through the oft-transformative filter of long-term memory, *while* reporting them to an experimenter, encompasses a rather complex temporal structure that the study ultimately glosses over.

A purely phenomenological investigation could not afford to misidentify an experience as it is immediately given in the present moment with how it is refracted and reconstructed through memory; what might be loosely termed 'phenomenological accuracy' is an integral aspect to what Husserl wanted to achieve with the *epoché.* To attest to the validity of the ***epoché's*** results, we must instead pivot to their scientific value.

Indeed, there are persuasive empirical justifications for accepting the phenomenological descriptions *qua* experimental data, e.g., that the effect was observed in several patients in more than one trial, that it predicted a subsequent empirical discovery and informed therapeutic measures, etc. The experimental instantiation of neurophenomenology may thus occasionally require sacrifices in phenomenological accuracy to the altar of experimental viability. If so, the particulars of this sacrifice shall likely depend on the population under investigation. It is easy to imagine how an experiment conducted during a hallucination, a manic episode may necessitate modifications to the *epoché*, though of a different kind.

Another methodological question to consider is whether the operationalised *epoché* is appropriate for capturing the type of 'experiential correlate' that this study sought to disclose. It can be argued that the undeniably physiological underpinnings of a seizure, and the clinical benefit inherent to profiling it, endorse it as an exemplary candidate for *experimental* neurophenomenology. Experiences that characterise an epileptic seizure seemingly suffer little from being uprooted from their meaningful place in an ecological context. An epileptic seizure is an inherently disruptive event, temporarily subsuming all other aspects of brain functionality. Furthermore, its suddenness and rarity ensure it is perhaps less coherently integrated into one's selfhood when compared with other psychological phenomena (e.g., biographical

history, aesthetic preference, unconscious motivation) or even disorders such as schizophrenia and bipolar.

E-NP is seemingly better tailored to studies in which intricate forms of intentional comportment (such as the case of Schneider) play a less prominent role; this way, a clear and parsimonious relationship between neural activity and experience can be exhibited. However, some of the phenomenological data did indicate the existence of a somewhat more complex intentional relationship indicative of the preictal stage. The preictal stage's emergence seemingly accompanies a more fundamental shift in the agent's intentional orientation, which Petitmengin (2009) claims "seems to correspond to a deep modification of patient's relationship to self and world".

For instance, one patient reported a kind of depressive-existential malaise: "[the experience] is rather negative because all of a sudden I realise the absurdity of what we are, of what we do… [this indicates] I am very likely to have a seizure". Less frequently, patients also reported an unplaceable sense of *contentment* with regards this growing sense of detachment: "I feel a sort of pleasure falling into the seizure…the pleasure of someone who has dropped everything… who is finally going to recover the freedom of everything."

Adopting a model of linear causality, we might claim that the oncoming epileptic seizure *causes* these profound background-intentional modifications. Though this conclusion is in-keeping with some epistemological tenets of cognitive neuroscience, it is nevertheless disfavoured by both canonical phenomenologists and neurophenomenologists. Varela's own position was marked by a committed anti-foundationalism, ultimately privileging neither the brain nor experience (Bitbol 2012).

How then might the relationship between brain and experience be conceptualised neurophenomenologically? Heidegger's notion of a 'world-disclosing' Mood (*Stimmung*) may be more appropriate; a mood represents no explicit object, but filters the way things (ourselves, others, the absurdity of life) show themselves to us. Both depression and contentment, which accompanied the experience of growing detachment concurrent with the preictal stage, are not fleeting qualia but present the world to individuals in a particular configuration. These results highlight the complex and multifaceted constitution of the agent's relationship to self and world and, more generally, the persisting difficulty in carving out any single causal relationship in neuroscience.

VIII. Conclusion

Disclosing new experiential categories is of particular utility to clinical instantiations of neuroscientific research, where such phenomena have a pronounced diagnostic utility. We cannot infer either the joyful or melancholic experiences associated with preictal desynchronisation from the neuroimaging data alone; instead, a specific methodology like the experimental *epoché* is required to measure this dimension accurately.

This highlights how, as Petitmengin concludes at the end of the paper, "instant after instant, the scission between self and world is created and maintained". Adopters of E-NP must be attentive to the fact that a neurological profile's cognitive-experiential correlate may not be limited to 'simple' sensations and thus must remain sensitive to more 'global' shifts in intentionality. These complex intentional relationships, (i.e., a rising sense of life's absurdity) is equally indicative of a characteristic pattern of brain activity as are 'tiredness' or 'lack of energy'.

In sum, the example of E-NP research analysed here managed to uncover a robust correlation between designated sets of experiences (positive; negative) and specific patterns of neural activity (desynchronisation or hyper-synchronisation of the epileptic focus). Prior qualitative investigations into the prodromal stage of a seizure had not produced such data, implying E-NP can indeed disclose unique experiential categories. The operationalised *epoché* aided participants in attaining reflective awareness of the preictal stage's experiential correlate and enabled them to verbalise it. Once profiled, its emergence was detected at an earlier point than originally assumed. By implication, we might speculate to the existence of several unrecognised phenomenological and neurological profiles that are of equal difficultly to detect. As an experimental design, we can expect that E-NP will likely be altered, modified and improved as successive researchers implement it.

Chapter 3. Constitutive Neurophenomenology: Empathy

I. Introduction

Constitutive neurophenomenology (C-NP) is distinguishable in two ways. The first pertains to the extended width of its scope: C-NP draws upon an eclectic array of material and is not anchored to explicating any *particular* study or dataset. The second pertains to C-NP's emphasis on articulating a positively-framed *definition* of its subject matter as a research goal. However, this begs the further question of how researchers should frame the 'subject matter' that constitutive neurophenomenology 'defines'. Correctly designating C-NP's object of inquiry entails convincingly negotiating the points of convergence between neuroscience and phenomenology at a broad scale.

A fully satisfying analysis of this question on epistemological and metaphysical grounds is beyond the scope of the present analysis and has been discussed elsewhere (Keen 1975; Osborne 1994). Instead, we will reorient towards a more practical plane by underlining the purpose of a contemporary cognitive neuroscientific *model*, before determining if a neurophenomenological approach fits the bill. In their analysis of multisensory integration, Fujisaki, Kitazawa and Nishida (2012) claim that a neuroscientific model should coherently unify three dimensions: the objective, the subjective and the neurological. Under this framework, lived experience, the brain, and environment each constitute part of an interrelated object of inquiry. Where this objective-subjective-neurological phenomenon (i.e., memory, language, perception) converges might be termed an 'aspect of consciousness' (Frankish and Ramsey 2012) or, more succinctly, a 'cognitive domain'.

Further clarification of C-NP's aim can be made by comparison with other meta-theoretical approaches, including evolutionary psychology, computationalism and Bayesianism. At one level, evolutionary psychology mirrors *interpretative* neurophenomenology by explaining experimental findings through the provision of a conceptual framework. Experimenters can invoke evolutionary psychology (and by extension evolutionary biology) as an on-hand framework poised to elucidate particular empirical findings. For instance, the existence of specialised mechanisms for detecting looming (approaching) objects, both visually and audibly (Neuhoff 1998; Grassi 2010), has been explained through recourse to the mechanism's adaptive function. The interpretation holds that it privileges on-coming, potentially dangerous objects and animals (an approaching lion, a falling rock) and is thus explained by a phylogenetic adaption imparting its signature in the human brain.

However, the evolutionary psychologist may expand their horizon by proposing an evolutionary model *of* a broadly-defined 'cognitive domain' (multisensory perception, memory, decision-making), cohesively encompassing the domain's constituent elements accordance with a conceptual framework. In turn, this permits the formulation of an operational definition of '*cognitive domain **X**'* according to a faithfully evolutionary perspective. For instance, in modelling the cognitive domain of social cognition, Neuberg and Schaller (2015) "articulate the *logical foundations* of social cognition [and] discuss *the ways in which social cognition is inherently* [evolutionarily] *motivated* social cognition" [emphasis added].

Computationalism also features both an interpretative and 'constitutive' function, either providing a lexicon to describe 'cognitive operations' or modelling a cognitive domain according to select principles. A computational account of *X* transfers neurological events into cognitive events by employing computer-based and

information-processing metaphors (Barrett 2012). Hypothetically, this kind of modelling can ascend up to endowing ontological status to the mind or brain itself in accordance with a particular framework. Examples include *The Computational Brain* (Churchland 2016) and the edited collection *The Bayesian Brain* (Doya, Ishii, Pouget & Rao 2007). Such accounts assimilate theoretical and empirical literature to define mind and brain according to computational (the brain is *inherently* an information-processing and storage system) or Bayesian (the brain is *inherently* a future-orientated probability calculating system) principles, respectively.

Thus, in C-NP, the phenomenological contribution mirrors evolutionary, computational or Bayesian neuroscience, which thread together the objective, neurological and subjective elements of a cognitive domain according to the assumed principles of a meta-theoretical framework. For our purposes, we do not wish to evaluate the momentous task of defining the brain itself according to phenomenological principles.[12] Instead, to elucidate how C-NP can model a cognitive domain in neurophenomenological terms, we will turn to the exemplar represented by mirror neuron (MN) research and the cognitive domain of empathy. Unlike, for instance, an evolutionary model of empathy, neurophenomenology is uninterested in adopting causal reasoning to determine empathy's 'origin' or 'reproductive value' and will instead model empathy in correspondence with phenomenological analysis and experimental findings in MN research.

Phenomenology's heightened receptivity to the *structural* foundations of experience expedites the merger between the objective, subjective and neurological levels into a cohesive model. Phenomenological experience should not be confused with 'life

[12] Perhaps the closest any author has come to attempting this is in Thompson's (2007) '*Mind in Life*'.

experience' in the biographical sense, e.g., 'negative life experiences can activate a predisposition to schizophrenia'. Experience for neurophenomenology is neither biography nor 'mere subjectivity': an epistemologically dubious account of unfalsifiable introspection (Nisbett and Wilson 1977). Properly wielded, experiential descriptors can provide vital information about brain functionality and disclose testable properties of the brain to help researchers understand the nature of the phenomenon they are investigating.

II. Mirror Neurons and Empathy

The driving impetus for the cross-disciplinary approach analysed here emerged when technology-driven insights provided by neuroimaging apparently complemented earlier phenomenological accounts of intersubjectivity. Mirror neurons (MNs) were discovered in the brains of macaque monkeys in the format of single-cell recordings using intracranial electrodes (Rizzolatti et al. 1996). Neuroscientific evidence for the existence of MNs is supported by studies using MEG (Hari et al. 1998), EEG (Cochin et al. 1999) and fMRI (Chong et al. 2008).

MNs are localised to the ventral premotor and posterior parietal cortices and acquired their name because they appeared to emulate patterns of neural activity occurrent in brains of an observed party (Gallese et al. 1996). In brief, when the agent observes cognitive, behavioural, or affective states in another person, neurons in the observer's brain will replicate patterns of activity occurring in the brain of the other. For example, neurons will fire in the pars opercularis when the agent both *experiences* anger and *observes* anger in another (Carr et al. 2003).

Notably, any strictly physiological exposition of mirror neurons becomes quite quickly exhausted. A substantial overview of MNs must make mention of the cognitive

domains of emotion, perception, action and so forth, which have been traditionally elucidated with psychological tools and, of course, by phenomenological tools also. Indeed, in the immediate aftermath of a neuroscientific discovery, it is taken as a matter of course that the neuroimaging data *per se* constitutes only half of a complete picture. Conceptual insights into cognition are subsequently enlisted to help ascertain which aspects of 'mind' a neural region or class of neurons relate to. Thus, as with many neuroscientific discoveries, the properties of mirror neurons were *initially* extrapolated by pivoting to a folk-psychological understanding of mind.

Indeed, the preliminary coupling of mirror neurons with empathy was quite common-sensical. Whether or not *my* mirror neurons fire in *my* brain depends on what *I* see the *other* do. Furthermore, *where* these neurons fire in my brain depends upon *where* they fire in the other's brain. When a connection is established between self and other, particularly if it is a connection based upon *understanding*, such a phenomenon is typically termed 'empathy'. So far, so simple: the classification of MNs as empathy-related neurons satisfies the criterion of 'face validity', the superficial assessment of whether or not the construct describes what it claims to describe. Indeed, few scholars have denied that mirror neurons are connected with empathy, even if some (e.g., Hickock 2014) have downplayed their pivotal role. As the experimental data accumulates, however, an increasingly sophisticated account of the cognitive domain under examination, *beyond* that of folk-psychology, becomes increasingly essential. The claim '*mirror neurons facilitate empathy*' thus leads directly onto the thorny issue of having to comprehensively define empathy.

MNs are implicated in the *understanding* of others because they appear to be receptive to the goals and intentions of an observed party. How then should the relevant literature conceptualise this phenomenon? Rizzolatti et al. (2009) critically

note: “it has been assumed that the understanding of actions performed by others depends on inferential reasoning”. While a genealogical analysis regarding this assumption’s origins are not of interest here, suffice it to say that it did not fall out of the sky. Indeed, a prevalent model of empathy contemporaneous with the discovery of mirror neurons was the ‘theory-of-mind’ model (Preemack & Woodruff 1978). The APA defines ToM as “the ability to imagine or make deductions about the mental states of other individuals” (American Psychological Association, 2009, p. 520).

However, the problem with utilising the ToM model of empathy was that it apparently corresponded poorly with the properties exhibited by MNs. Theory-of-mind conceptualises empathic understanding as the product of acts of interpretation (hence the term ‘theory’). By contrast, MNs fire during the agent’s perception of the other, in parts of the brain that parallel the other’s brain. As Gallagher and Zahavi (2012) note, this all happens far too quickly to involve any cognitively complex act of reflective thought. MNs seemingly activate immediately and involuntarily as soon as the other’s actions are perceived.

A treatment of empathy seemingly more cohesive with MNs, however, was discovered in accounts provided by phenomenological philosophers. Phenomenology adopts a somewhat ‘heavy-duty’ approach to the intricacies of experience, even though, unlike subsequent computational accounts, it was not *initially* developed in communication with modern neuroscience. Nonetheless, years of accumulated experimental data, alongside their philosophical interpretations, have enabled the progressive formulation of what might be called a neurophenomenological model of empathy. This model conceptualises empathy from the ground-up according to its mutually informative phenomenological (‘cognitive’) and neurophysiological dimensions.

According to Iacaboni (2008), the claim that phenomenology directly informed the interpretation of MNs is quite straightforwardly validated:

> Gallese was digging into Merleau-Ponty's work, finding the appropriate analogies between philosophy and neuroscience, explaining the group's discoveries in less scientific and more philosophical terms (2008, p.16).

The phrase "more philosophical" simply denotes that the empirical findings were translated into the language of phenomenology. Gallese first adopted the procedure outlined in chapter one, whereby an experimental finding lacking proper expression from within an existing conceptual paradigm is explicated by cross-referencing it with a phenomenological paradigm. However, we know that *constitutive* neurophenomenology can expand its horizon further than this act of experimental contextualisation and refocus its attention toward the broader 'cognitive domain' in question.

It should not be taken for granted that folk-psychological or behavioural accounts of empathy accurately or exhaustively capture what is imparted by the empirical data. In this case, building a comprehensive model of MN functionality hinges on providing an 'operational definition' of the broader phenomenon of empathy. What several philosophers and neuroscientists have attempted since the discovery of MNs is to integrate experimental data and phenomenological descriptions toward the goal of classifying empathy according to its neuro-phenomenological attributes. Consequently, this classification, provided it is plausible, should have ramifications for how empathy is treated across the cognitive sciences.

III. Defining Empathy

As Batson (2011) illustrates, researchers "agree empathy is important but often disagree about what effects it has and what it is". Similarly, Zahavi and Michael

(2018) claim: “when considering the current debate on empathy, it quickly becomes evident that a diversity of definitions of are available, and no consensus seems forthcoming”. However, Gallagher and Zahavi (2012, p.203) suggest that “any intentional act that discloses the other’s subjectivity counts as empathy”. By operationalising this expansive definition of empathy, we can examine MN research in conjunction with both a generalised phenomenological *approach* to empathy, as well as with fine-grained descriptions of specific manifestations of empathic acts provided by individual phenomenologists.

Through merging phenomenological description with neurophysiological data into a unified account, the constitutive neurophenomenologist must uncover some of the defining elements of empathy and propose (within the logic of the model) what exactly empathy ‘is’. To understand how such an integration is possible, we will consider three broad convergence points that seemingly unite the phenomenological and MN-derived approach to empathy: 1) *Direct access,* 2) *Primacy* and 3) *Embodiment.*

III.i Direct Access

From Husserl onwards, a unifying theme in phenomenological philosophy is the notion that human beings can understand their world ‘directly’, without the need for theoretical engagement. In an intersubjective context, our absorption into social worlds of *shared* meaning ensures that we can (for the most part) accurately understand those who co-inhabit it with us *without* applying conceptual explanations to their behaviour. Much of the secondary literature surrounding Husserl’s phenomenology of empathy surrounds debates on whether empathy is indeed directed and unmediated (Zahavi 1996); Zahavi (2012) suggests such a view is

ultimately justified. Indeed, for Husserl, perceptual intending offers a more direct and accurate way for the agent to know the intentional 'object' as compared with representational forms of knowledge provided by signitive and pictorial intending. Following this logic, in perceiving the other formulate an expression, gesture, or action, I am immanently presented with that action's significance.

Such a sentiment evokes Wittgenstein's claim that "we see emotions – we do not see facial contortions and make an inference from them (like a doctor making a diagnosis)" (1967, p.225). However, an interlocutor may contend that this view of empathy is appropriate for when the agent must understand affective states, but cannot extend to so-called 'cognitive states', i.e., the other's intentions, desires, or motivations, which are allegedly hidden from view 'inside' the other's mind. It appears intuitively plausible that one directly *perceives* the sadness, apprehension or joy in the other, yet must *infer* their intentions, desires and motivations. Recognising these discrete modalities of social understanding, a growing body of literature differentiates between *cognitive* and *emotional* empathy (Smith 2006), with ToM postulated to explain the former.

Could 'emotional empathy' – an immediate, contagion-like simulation of witnessed affective states – be best articulated by appealing to some kind of immediate access, while 'cognitive empathy' – the understanding of other's intentions and motivations - be solely explained by a theory-like mechanism?[13] While such a distinction has merit, several experimental procedures have indicated that MNs are highly implicated in acts defined as *cognitive* empathy. According to these interpretations, the agent readily understands (particular instances of) the other's cognitive state

[13] Zahavi (2012) argues Lipps' (1900) phenomenology of empathy is appropriate for understanding what contemporary psychologist's call 'emotional contagion'.

when directly observing their actions. While the terminological employment ‘cognitive empathy’ is disfavoured by phenomenologists, what it denotes (understanding the other’s intentionality) has been the subject of several in-depth phenomenological examinations.

What neurophysiological evidence supports the notion that ‘cognitive empathy’ is constituted by some kind of ‘direct access’ to the other’s mind? Early in the history of mirror neuron research, Gallese et al. (1996) discovered that MNs do not activate upon observation of movements that merely mimic goal-directed actions. MNs are seemingly ‘aware’ of whether or not an action features a ‘real’ intentional referent and fail to activate upon observation of merely ‘pantomimed’ actions. It then follows that the brain can understand the intentional-directedness (or lack thereof) of an authentically goal-directed movement before conscious reflection designates it as such. It was hypothesised that MNs favour concrete, goal-directed movements because these movements disclose ‘real’ information about the other’s intentionality, whereas pantomimed movements do not.

Thus, the Gallese et al. (1996) study provided early evidence that cognitive empathy need not (always) recruit a reflective cognitive procedure that adds conceptual content onto the raw data of visual perception. Through successive experimental manipulations, the extent to which MNs are responsive to cognitive states (and not just physical movements) has been explored. Behavioural studies had already found that, when asked to imitate actions, children often imitate the *goals* of actions instead of mimicking the precise movement itself, even without instruction (Bekkering et al. 2000). Using fMRI as a measure, Koski et al. (2002) replicated this paradigm with adults. They found that MNs in Broca’s area exhibited a stronger activation when participants observed seemingly goal-directed movements, even if this goal was only

implicit (i.e., a finger covering a dot). Similarly, Molnar-Szackas et al. (2005) found stronger MN activation in conditions where participants observed ‘structured’ actions (cups being arranged in size order) compared with ‘unstructured’ actions (cups being arranged randomly).

Furthermore, MNs are not only receptive to the ‘local’ goal of an action (e.g., picking up a cup to drink) but to its ‘global’ context as well. One experimental manipulation (Iacoboni 2004a) had participants watch video recordings that featured three conditions. In each recording, a different scenario was presented: ‘grasping actions’, ‘contextual grasping actions’ and ‘context only’. As measured by fMRI, MNs exhibited their strongest response when witnessing the contextual grasping condition, implying that MNs account for the contextual setting in which an intentional-action is embedded, automatically prioritising ecologically congruent actions. This is likely because contextual actions disclose the most pertinent information about the observed party’s intentions. Iacoboni (2004) asserts that these findings attest to an underappreciated ‘holism’ of brain functionality, in which action, intention and context are comprehended directly and simultaneously instead of being cobbled together by a sequential reasoning process.

These data suggest that the intensity of MN activity positively correlates with how ‘purposeful’ a perceived action is. Mirror neurons seemingly display preferences for activities reflective of an observed agent’s intentionality, which translates into an empathic ability to understand their ‘cognitive state’ directly. Owing to an automatic, MN-enabled pairing between two agents, the observer can be said to understand the other’s goals and intentions with an immediacy and accuracy comparable with other perceptually-accessed ‘objects’. Consequently, in addition to MNs mirroring the *where* of the other’s brain, MNs help agents understand the *why* of perceived

actions, with each constituting an essential component of the neurological response to social experience.

Which further details to this picture can be provided by consulting the phenomenological literature? Zahavi (2012) formulates Husserl's position on empathy as articulated in *Ideas II* thusly:

> If I talk with another [and] look him in the eyes, I have the liveliest experience of his immediate presence. I am justified in saying that I "see him" qua person, and not merely qua body.

What are the necessary conditions for seeing the other *qua person* instead of *qua body*? While there is a separate, quasi-ethical element to seeing "the person",[14] part of *seeing* a person and (not just a spatially extended meat-sack) involves seeing (and therefore understanding) their intentions and motivations. This notion seems to corroborate MN evidence suggestive that agents have comparable access to a movement's intended goal as to the physical motion itself; thus, by seeing the movement (*body*) agents simultaneously see the intention (*person*). Therefore, in perceiving the other in *propria persona*, I instantaneously disclose his intentional comportment without applying theoretical explanations of his intentionality to sensory perceptions of his form.

In Zahavi's interpretation of Husserl, this direct access to the other's personhood constitutes the "appresentation of the other", whereby absent profiles of intentionality are perceptually presented alongside their material body (Zahavi 2008). I am always (ap)presented with the other's acting as an *acting-for-something*: "the running of the other in the forest as flight, the hiding behind a stone as a protection from missiles," (Zahavi 2012). Although appresentation provides me with a profile of the other's

[14] See Levinas (1987).

personhood somewhat indirectly, it is nonetheless provided perceptually, not theoretically. On phenomenological grounds, there is little reason to presume I first perceive the physical movement of running, *then* include the forest as context, *then* posit the intention as flight: each element is experienced simultaneously, as Iacoboni (2006) surmised. For Husserl, I am equally capable of direct perceptual access (which, under certain circumstances, features epistemological weight) to the other's personhood ('cognition') as to their physicality.

However, MN evidence indicates that there is also a powerfully *enactive* component to person-perception in which the motor cortex plays a significant role. How this component co-constitutes empathy can be further developed with recourse to Heidegger. Heidegger's notion of 'primordial understanding', especially as interpreted by Dreyfus (1991), fleshes out the phenomenological distinction between *understanding*, taken as practical know-how, and *interpretation*, taken as theoretical knowledge. On this account, *understanding* is pre-theoretical and practical, while *interpretation* is theoretical and disengaged. Applying this distinction to empathy, it is arguable that to *understand* the other (as opposed to interpreting them) the agent must be capable of partaking in co-operative activity without drawing upon reflective deliberation. Neurophysiologically, the phenomenon of enactive understanding accompanies a MN-assisted merging of intentional orientation between agents and allows for "synchronic motor activity [that] fosters social connection" (Iacoboni 2008). Merleau-Ponty (1945, p.361) prophetically described this phenomenon as like "the other's intention inhabiting my body and mine his".

This 'shared motor-intentionality' supports the hypothesised existence of a mode of social understanding that makes the other directly intelligible so that social interactions need not involve acts of calculated reasoning. Indeed, this "shared

inhabitancy of intentionality" enables a spontaneous, pre-reflective response within a socially appropriate framework to arise in the observer. Therefore, the MN system's motor component helps the agent understand genuine, goal-directed movements *and* readies them to respond accordingly before reflective judgement takes hold.[15] This leads onto the question of how the agent perceives the 'non-human' environment, considering that the other's perspective always exists as a constitutive element. As Iacoboni et al. (2004a) demonstrated, MNs are receptive to the contextual cues provided by non-human objects when observing human action. Another class of neurons known as 'canonical neurons' will further illuminate this interrelationship between self, others and objects.

Canonical neurons resemble mirror neurons insofar as both are visuo-motor neurons that occupy area F5 of the brain (Gallese et al. 1996). Canonical neurons usually activate upon the agent's perception of graspable three-dimensional objects but, crucially, cease their activity if *another* person reaches toward them. Therefore, a static object's neurological (and phenomenological) correlate depends significantly on whether or not that object features as a motor-possibility for an observed party. Iacoboni (2004) approvingly cites Merleau-Ponty's (1945) concept of the intentional arc and his claim that grasping actions are "magically complete" from the outset because the intended-object suddenly "belongs to" the grasping motion. Again, the brain seemingly recognises this 'for-the-otherness' as a 'property' of the object without reflectively interpreting it as such. As phenomenologists had previously suggested, our perception of objects incorporates an ever-present understanding that these objects also exist for the other, from their perspective. As Iacoboni (2004)

[15] Some evidence indicates that neural regions involved in context-dependent motor responses and planning activate during certain interactions, such as in mothers who see their infants cry (Iacoboni 2008).

states: “canonical neurons illustrates the role of (potential) action for the constitution of the meaning of the world”.

For phenomenologists and MN theorists alike, ‘mirroring’ is not analogous to two isolated subjects establishing a temporary and fragile parallelism between each other before returning to some default mode of solipsism. Our pre-theoretical understanding of ourselves, others and objects always co-exist as constitutive elements of worldhood, aspects of which are neurophysiologically measurable. In recognition of this, Legrand and Iacoboni (2006) argue that MNs could be relabelled as “sharing neurons”, as they illuminate the inherently communal nature of the experienced world. With this in mind, the agent might be said to have as much ‘direct access’ to the minds of others as to their own, with the qualification that, in both cases, there is always the high possibility of making (and correcting) errors.

II. Primacy

Closely related to the hypothesis that agents can achieve direct access to the other’s ‘cognitive state’ lies the qualification that such access constitutes a foundational structure for empathising acts. Undeniably, ‘direct empathy’, as previously outlined, cannot be the *only* way humans accomplish social understanding. The neurophenomenologist is remiss to deny the existence of all empathising acts that require deliberation, speculation and/or inferential reasoning. A historian combing through the historical records to appreciate an ancient general’s military stratagem, a tourist struggling to interpret foreign customs or someone recalling their friend’s upbringing to excuse a distasteful trait all comprise ways of understanding the other(s) that are not exclusively facilitated by the direct perception of cognitive states.

However, for such activities to succeed, the agent must thematise the other and recruit higher-order reasoning, which phenomenologists and MN theorists maintain are only possible upon a background of unmediated, pre-theoretical intersubjectivity. While a C-NP model of empathy does not reject the existence of inferential methods of social understanding, neurophenomenologists seemingly posit an ordering of rank. *Pre*-theoretical forms of empathy are prioritised by virtue of their allegedly predicative characteristics because they scaffold *theoretical* forms of empathy. Indeed, phenomenologists had long relegated theoretical empathy to something of a subordinate status: “the other's gaze transforms me into an object, and mine him, only if both us withdraw into the core of our thinking nature”, (Merleau-Ponty, 1945, p.360). Similarly, Scheler (1923/1954, p.261) claims that the “expressive unity” normally available in immediate social interactions only becomes divisible (and thus amenable to conjecture) through a deliberate “process of abstraction”.

Returning to Heidegger’s epistemological distinction between understanding and interpretation, it has been claimed that interpretative acts are grounded upon more ‘primordial’ forms of understanding (Blattner 2006). As a derivation, it follows that interpretative empathy is erected upon a pre-existing foundation of primordial empathy. According to Scheler, Heidegger and Merleau-Ponty, theoretical empathising, which must employ reflective reasoning to succeed, is preceded by “*withdrawal* into thinking”, which abstracts the immediate nature of social *understanding*. While surely invaluable for many instances of sociality, phenomenological and neurophysiological evidence indicates this is not the principal way that human beings understand one another in regular circumstances. Therefore, both phenomenologists and MN-theorists seek to ‘look behind’ interpretative modalities of empathising to its *constitutive* structure.

Indeed, this idea of ‘primacy’ is not alien to MN neuroscientists; Legrand and Iacoboni (2009) claim the “primary inter-subjective relation is made possible through the sharing of a common world, by virtue of the execution and observation of goal-directed actions”. Gallese (2005) argues on similar grounds: "in on-line social transactions... by means of intentional attunement, ‘the other [is] more than a representational system; it becomes a person like us". MNs seemingly supply neuroscientific evidence for the notion of ‘primordial’ social know-how, which posits that agents can respond in socially appropriate ways without deliberation. By contrast, the other only becomes a “representational system” when regular interaction breaks down and I must treat the other as a present-to-hand entity requiring interpretation. Indeed, Rizzolatti et al. (2009) corroborate that this so-called “piecemeal model” of empathy is only descriptively accurate when “the behaviour of the observed person is difficult to interpret”.

A further convergence point worth noting is that of voluntarism. Zahavi (2012) claims that “for Husserl, the most basic form of empathy [involves] the pairing of self and other [which is] not initiated voluntarily”. Of course, one never chooses to ‘turn on’ one’s mirror neurons like a light switch. MN-assisted social understanding is activated upon the direct perception of the other in the form of a neurophysiological response outside of the agent’s control and reflective awareness. Furthermore, the strength of MN activation correlates with the existence of intentional and contextual actions, as reflected in the immediate neurophysiological response, none of which appear to be initiated voluntarily or under executive control.

Finally, a C-NP model of empathy, like any other, must be capable of being *applied to* and *evidenced by* parallel forms of research. The idea that ‘direct’ empathy precedes ‘indirect’ empathy has found currency in developmental and clinical

psychology. Though the relevant literature is too expansive for proper discussion here, we will give mention to some key studies. Autism spectrum disorder (ASD) is often regarded as a social impairment disorder *par excellence*; it is perhaps unsurprising, then, that individuals with ASD have repeatedly been found to display MN-related deficits (Hari et al. 2004). Indeed, Dapretto et al. (2006) and Willaims et al. (2006) found diminished MN activity during imitation tasks, while Hadjikhani et al. (2007) found reduced cerebral thickness in the superior parietal, temporal, and frontal cortices, all of which are associated with the MN system. In a metareview, Williams (2008) asserts “the hypotheses of a self–other matching deficit and impaired mirror neuron function in autism have been well supported by studies employing a range of methodologies”.

Such evidence supports the hypothesis that disruptions in embodied, pre-reflective empathising acts, and the shared intentionality it otherwise facilitates, engender subsequent deficits in inference-based empathising. Gallagher (2001) points out that false belief tasks, a lynchpin of ToM, do not require participants to understand others whom they directly interact with, while Iacoboni (2008) points out that autism is diagnosable at two years of age, before ToM appears. Neurophenomenologists do not doubt the validity of ToM-like empathising abilities but are inclined to suppose their deficits are likely grounded in a more primary dysfunction located in the MN system. This appraisal preserves ToM as a legitimate construct but indicates that ‘theorising’ modes of empathising are aetiologically linked to deficits in pre-theoretical social understanding.

iii. Embodiment

If empathy is constituted by an ability to directly understand the other's mind upon perceiving their expressions and actions, empathising acts ostensibly feature a prominent bodily component. It is in seeing the frown, the grasp, the point, the sprint, as manifested in the body, that I intuit the intention intrinsic to the motion. As discussed, the manifestations of intersubjectivity facilitated by MNs should not be considered exhaustive. However, the phenomenon of 'bodily-motor resonance' emergent amongst agents partaking in embodied interactions appears foundational to empathic capacities generally. Developmental psychology aptly terms bodily-motor resonance (i.e., gaze following, vocal/facial mimicry) as 'primary intersubjectivity' and there is good evidence for assuming it emerges before theory-of-mind abilities, manifesting in infants and even neonates (Meltzoff and Moore 1994).

Zahavi (2012) claims that, for Husserl, "the most fundamental form of empathy is one that targets the somatological level", which unfolds through an "involuntary associative bonding of self and other on the basis of their bodily similarity". When intentional actions are witnessed, 'associative bonding' becomes possible through the medium of apperceived bodily resemblance. As noted by Gallese (2003), this procedure evokes Husserl's notion of 'pairing' [*Paruung]* whereupon the perception of the other's body elicits a "transfer of sense" of their "mental state" (Husserl 1931/1988, p.111). De Preester (2008) describes this phenomenon aptly as the mapping of the other's *Korper* onto my *Leib.* That is, the physical body of the observed party renounces its status as a mere material object and becomes integrated into the observer's field of first-person experience.

Indeed, supporting Husserl's claim that 'associative bonding' is both somatic and non-volitional, Gallese et al. (2012) argue that motor resonance "allows a direct

comprehension of others' goals and motor-intentions, enabling an embodied link between individuals". In neurophysiological terms, a distinct pattern of neural activity unfolding in the other's brain is, on my perception of them, replicated in my own brain. Arguably, this direct understanding of the other's intentionality perhaps mirrors the immediacy with which I grasp my own intentional experiences. Consequently, the *other's* motor-intentionality newly co-constitutes my *own* first-person experience, and vice versa. In the midst of this phenomenon, the other is not '*represented*' as a construct but *presented* as a person *qua* person and, on this basis, socially meaningful forms of co-operation are presented. Intentionality is therefore seldomly a private affair, but something intimately entangled with the intentionality of the other and facilitated by face-to-face embodied interactions.

Merleau-Ponty (1945) develops this line of thought with his notion of 'intercorporeality', which argues that bodily motor-resonance not only renders the *other* comprehensible but allows certain affording-features of the *environment* to become manifest, disclosing the world as a place where objects and actions are infused with collective meaning. Embodied interactions with beings sharing our bodily constitution serve to structure one's sensorimotor openings to the world because they showcase the world *as* a place *for* particular actions. Thereafter, what one learns from observing the other act upon the world becomes sedimented into one's practical social know-how. Consequently, an action's meaning can then be understood on this basis without deference to reflective thought.

Pre-empting recent studies in developmental psychology, Merleau-Ponty (1951) hypothesises that intercorporeality has powerful implications for child development. Moreover, the kind of embodied social knowledge that is facilitated by intercorporeality is not only developmentally crucial but remains an integral facet of

social understanding throughout one's lifespan. Indeed, Legrand and Iacoboni (2006) claim "the most primary and concrete way to consider others' perspectives on the world is to consider others' motor accesses to the world", a 'consideration' enabled by perceiving the other's body in action, the meaning of which is intuitively grasped.

Of course, this 'consideration' should not be construed as a conscious act of interpretation on the part of the observer, but rather as (ap)perceiving the other's motor-intentionality as it emerges automatically during face-to-face interactions. Even modifications in the brain's response to non-human objects materialise upon the recognition that it exists 'for-the-other', particularly when the agent perceives intentionally-directed human action. As demonstrated in canonical neuron research, neurophysiological responses to three-dimensional objects are modified whenever an observed party *reaches for* an object. The significance of reaching-to-grasp movements, as with most embodied actions, suddenly infuse the perceptual field with fresh meaning. As Merleau-Ponty's states: "my gaze falls upon a living body performing an action and the objects that surround it immediately receive a new layer of signification" (1945/2012, p. 411).

Perhaps for these reasons, Rizzolatti (2005) surprisingly claims: "mirror neurons do not have a specific, functional role". That is, MNs inhabit a vast range of cortical brain regions, enabling the agent to understand, and even experience, a wide spectrum of phenomena. On this basis, MNs can arguably be seen as constitutive of not only intersubjectivity but of worldhood also. After all, witnessing the other's comportment towards the world and interworldly objects transfers over to my understanding of those same phenomena whereby I become 'locked in' to a particular understanding of the world. Thus, MNs seemingly corroborate a sentiment

found among several phenomenologists who claim that we are thrown into a world of pre-established meanings and practices, and the contours of our engagement with the world are intimately connected with its presence as a place that is shared with others.

IV. Combining Evidence

Using research into the cognitive domain of empathy and MNs as a case example, we oversaw how combining phenomenological and neurophysiological evidence into a unified account aides the recognition of a cognitive domain's constitutional structure. In several instances, appropriating phenomenological descriptions of empathy helped make sense of neurophysiological recordings obtained from participants engaged in emphasising acts. Three criteria are operative in establishing MNs as empathy-linked neurons: *triggering conditions* (MNs activate when agents observe intentional or expressive actions), *spatial location* (MNs activate in matching neural regions in observer and observed) and *temporality* (MN responses operate on a time-scale approximate to perception, not higher-order cognition). While the MN system is hypothetically expressible in physiological vocabulary, pursuing a comprehensive articulation of its so-called 'cognitive correlate', or even a functional account of its conditions of activation (e.g., *how* the brain registers intentionality from body-perception) motivated a leap into phenomenology.

Integrating experimental data with phenomenological accounts of empathy was actualised through identifying phenomenological-neurophysiological convergence points in three key areas: '*direct access*', '*primacy*' and '*embodiment*'. Consequently, a model was obtained that illuminated empathy as a largely pre-theoretical, context-

driven, and non-volitional act, enabled by an immediate understanding of the other's mind by perceiving their body.

Notably, the empirical findings' theoretical implications independently corroborated pre-existing phenomenological accounts of empathy. Indeed, when faced with the challenge of articulating empathy's conditions of possibility (a surely unavoidable task when expounding empathy-related neurons), the discoverers of MNs were, like Husserl, unsatisfied with the prevailing theories open to them (Iacoboni 2008). Indeed, presuming that empathy is defined by an intellectual process of mind-reading runs counter to how empathy is given in experience and, now, in certain experimental data also.

The lack of an appropriate operational definition for MN-related empathy perhaps retroactively substantiates Husserl's assertion that dubious presuppositions permeate scientific and philosophical reasoning, diminishing the investigator's certainty that common-sense or even science should unfailingly serve as conceptual footholds. The compatibility between non-scientific, phenomenological descriptions of empathy with breakthrough neuroscientific discoveries arguably validates Husserl's employment of the *epoché*, which allegedly enabled an intentional-object or intending-act to be given as an "originary presentive intuition", free from such obscuring presuppositions.

For Husserl, phenomenological evidence hinges on the correct intuition of a categorical experience's underlying structure, with its contingent contents stripped away. If empathising is a categorical experience, characterised by an intentional-act of disclosing the other, its structure is amenable to an eidetic investigation. Husserl

labelled evidence provided in such a format ‘apodictic’, as it proposedly grounds any subsequent, contingent examples of the phenomenon in question.

However, Husserl did not conflate apodicticity with self-transparency (Schmid 2001) and, later in his career, “explicitly endorses the fallibility of evidence and confirmation in the course of further investigation” (Berghofer 2018). Indeed, succeeding phenomenologists took different approaches to the question of empathy, though they largely remained within the gravitational pull of Husserl’s original investigations. As shown, several of those investigations proved useful in constructing a neurophenomenological model of empathy.

Finally, as a discipline that utilises philosophical argumentation, phenomenological analyses are entirely amenable to peer-review and intersubjective corroboration. Like scientific investigations, all phenomenological accounts are subjectable to criticism, amendment, expansion, reformulation and rejection. Taken thusly, phenomenology more closely resembles Sellars’ (1997, p. 79) construal of science as “a self-correcting enterprise, which can put any claim in jeopardy, though not all at once” than Sellars anticipated.

V. Conclusion

It should be noted that, at the levels of both brain and experience, a C-NP model should seek to apply to human beings generally, (provided they possess a brain). To successfully legitimise a C-NP model, a discernible neurological profile should co-extend with an identifiable phenomenological profile, i.e., the presence of MNs should be consistent with universal (not ephemeral) empathic experiences. Mirror neurons are informative of empathy’s constitutive structure because they are detectable constituents of *the* brain and not just the brains of some experimental

subjects. A neurophenomenological model is therefore vulnerable if, at the structural level, empathic experiences fluctuate incoherently. Indeed, the field of neurophysiology often operates on the assumption that its findings are generally replicable across the population, which suggests that neuro*phenomenology* should operate on somewhat analogous principles.

Thus, it is the *form* of experience and not experience's contingent *contents* that a C-NP model seeks, where possible, to reveal.[16] The specific, embodied practices a sole individual acquires may be biographically and culturally contingent, but the structural foundations scaffolding their ability to learn, enact and recognise meaningful practices seemingly remains uniform across individuals.[17] Bodily pairing, for example, can assume innumerable outer manifestations, transverse a range of contexts, and transpire between countless empirical individuals (*content*); yet, structurally, it is by definition always constituted by an automatic synchronisation of bodily motor-intentionality between two or more minded bodies (*form*).

Finally, as a neuroscientific model, C-NP should pursue external validity by supplying a useful operational definition to interrelated research programmes, including clinical psychology, pedagogy and primatology. A C-NP model of empathy helps researchers determine what exactly empathy '*is*' by revealing its structural components on both a phenomenological and neurological basis. Thus, phenomenological analyses of experience offer a much more substantive window onto neural functionality (and its 'cognitive' correlates) than what is offered by introspective accounts provided by untrained subjects. Thus, we can perhaps agree

[16] Although Heidegger might claim that it is in the 'content', not the 'form', where the most revelatory information resides.
[17] Moreover, individual differences the MN-empathy relationship correspond to a pattern; individuals with higher MN activation are more empathic (Pfeifer et al. 2008).

with Heidegger (1925/1992, p.71) in that “constituting does not produce in the sense of making and fabricating; it means letting the entity be seen in its objectivity”.

Chapter 4: Applying the Findings

Part 1

How might the paradigmatic cases of neurophenomenological research analysed above showcase how neurophenomenology can inform the neurosciences in a more general sense? Here, we will assess how adopting a neurophenomenological approach *or* utilising findings from neurophenomenology in other research programmes can inform: a) the interpretation of evidence and b) the construction of experimental designs. To accomplish this, we will discuss some prominent and commonly used means of assessing validity in neuroscientific practice and investigate how the application of neurophenomenological methods and/or results might inform their evaluation.

Specifically, we will focus on ecological validity, content validity and construct validity. It should be underscored that phenomenology's contributions to neuroscientific practice are not unsolicited and unrequited overtures. While tensions and divergences between phenomenology and neuroscience undoubtedly exist, if neurophenomenology can be legitimatised as a neuroscientific sub-discipline, it is because it promotes the resolution of problems *already* identified by neuroscience.

I. Ecological Validity

In Heidegger's (1952/1977) essay 'Science and reflection', Heidegger argues that scientific naturalism conceals as much as it reveals due to its need to establish linear causality and conflate the "real" with the "factually certain". Perhaps this insight is especially incisive when scientific realism places 'mind' under its microscope. To succeed, a psychological experiment must isolate particular facets of cognition,

define them as variables and subject them to experimental manipulations. The ‘horizon’ or ‘background’ that interest phenomenologists are too multifaceted for inclusion in any singular experimental design, as individual cognitive acts must be parsed apart and studied in relative isolation from each other. Consequently, cognitive neuroscience risks treating psychological phenomena as detached processes devoid of relation to wider experience, while phenomenologists often emphasise that extracting mental events from their meaning-giving background risks presenting them in a distorted format.

This sentiment is well-articulated by Fuchs (2002): “on the phenomenological level, there is nothing like a “mental event” that could be isolated from the world and the stream of conscious experiences”. However, scientific psychology echoes an analogous criticism, recognising that the laboratory setting may impair the *ecological validity* of the phenomenon studied. Eyseneck & Keane (2015, p.5) define ecological validity as “the extent to which laboratory findings are applicable to everyday life”. By implication, mental events embedded in their ‘everyday’ setting somehow approximate their ‘true’ expression. Unlike a photon or kidney, the psychological variable (engaging a task, understanding the other) is difficult to *genuinely* understand through experimental investigation unless some effort is made to ‘re-home’ it.

Ecological validity may be impaired if a ‘mental event’ or ‘cognitive domain’ is stripped of the qualities that initially framed its study as worthwhile. Consequently, we no longer measure the phenomenon ‘in itself’ but rather a manipulatable variable without a clear existence beyond the laboratory. As Heidegger would agree, the restrictions imposed by the scientific method are not only contingent, frustrating by-products, but necessary and ineliminable conditions of its success. The separation of

a mental event from global context, while crucial for obtaining a calculable result, presents a considerable challenge for ecological validity. Thus, the experimental psychologist committed to reinserting psychological phenomena back into their meaningful context has two choices: alter the experimental design or utilise theoretical supplementation.

As discussed, Iacoboni (2006) notes several examples where the inclusion of global context promoted an astute interpretation of experimental results or influenced an experimental design. For instance, understanding why canonical neurons alter their activity when intentional actions are directed towards objects was augmented by suspending the assumption that 'object' and 'other' occur in entirely separate domains, sub-served by sequestered neural pathways. Similarly, Merleau-Ponty (1945) argued that the classical conception of body schema was impaired insofar as it omitted the patient's world-directedness; that is, how worldly tasks shape the contours of the schema. This inclusion helped contextualise Schneider's aberrant behaviour.

Moreover, applying a particular phenomenological account to a specific experimental protocol might help researchers recognise specific ecological validity flaws. Imagine a psychologist studying intersubjective emotion who presents participants with photographs of people who will generate strong emotional reactions. Drawing on Husserl's phenomenological distinction between signitive and pictorial perception, a commentator can argue that there is an important distinction between photograph-perception and person-perception, a distinction possibly reflected in the brain's response. Receding to a broader scope, we might argue that Heidegger and Merleau-Ponty persuasively showcase that the way that intentional-objects present themselves to the agent are heavily influenced by the agent's capacity to interact

with them. This is a factor that is difficult to replicate in neuroimaging experiments where participants must remain stationary.

If the gulf between a cognitive domain's laboratory-induced expression and its 'everyday' expression appears unbridgeable, the experiment is vulnerable on grounds of ecological validity. However, it appears evident that many central facets of normative phenomenological research will undoubtedly translate poorly to the experimental setting. Therefore, some research initiatives may be appropriate for a purely phenomenological or neuroscientific investigative approach. An agent's historicity, for example, represents an incredibly important dimension for understanding the entity psychologists call 'mind'; yet, it is difficult to conceive how this notion could survive a transition to the logic of experimental psychology without being disfigured in the process.

In sum, both neurophenomenologists and experimental psychologists suggest that articulating the 'genuine' manifestation of human consciousness, as defined by its manifestation in "everyday life" instead of as an experimental variable, represents the real aim of a research programme. The psychologist or cognitive neuroscientist therefore endeavours to replicate the essential nature of a psychological phenomenon as an authentic, environmentally-grounded and multifaceted entity from within the laboratory or rectify any paucity through theoretical supplementation.

Harnessing phenomenology helps researchers have a greater idea of the form that ecological validity flaws might take, while treating failures in ecological validity as *surmountable* problems mean that they are easier to mitigate at the levels of design and interpretation. Greater cognisance of the ways ecological validity can be found

lacking thus increases the likelihood that effective measures can be taken to reintroduce ecological validity into neuroscientific practice.

II. Construct Validity

Whether experimental neurophenomenology retains pertinent ecological information regarding the phenomenon it studies is unclear; indeed, as an experimental design dependent on neuroimaging, E-NP is unambiguously confined to the laboratory.[18] Nonetheless, E-NP's methodological approach might be well-suited to certain research initiatives in which a type of measurement validity known as 'construct validity' might otherwise be called into question. Construct validity evaluates the degree of compatibility between a measurement tool and the phenomenon under investigation. While the experimental *epoché,* the main tool wielded by E-NP, should be subject to its own independent assessment of construct validity, what interests us here is how employing E-NP's protocol might benefit specific research programmes in which issues in construct validity might otherwise arise.

An essential precept in E-NP's epistemological stance is that quantifying the phenomenological data is deemed tantamount to reducing its descriptive and diagnostic power. Several well-known measurement tools require that the 'first-person' information supplied by subjects undergo quantification according to pre-determined sub-scales. Such measures range from diagnostic assessments such as the Schizotypal Personality Questionnaire (SPQ) to empathy measurements like the Interpersonal Reactivity Index (IRI). By contrast, Lutz and Thompson (2003) and Petitmengin et al. (2006) maintain that, when reporting the neuroimaging data's

[18] However, patients did report alterations in their intentional relationship towards themselves and 'world', which had apparently been missed by previous measures.

cognitive correlate, the terminology adopted must be expressive and conceptual rather than numerical and statistical.

While some ‘orthodox’ approaches in the philosophy of science (such as the Corpusclian approach) dictate that quantitative items should ideally replace qualitative items in science (Harre 1976), the neurophenomenologist firmly rejects this injunction. Motivating this verdict is the belief that descriptive terminology approximates the nature of the thing studied. Put differently, numerical items do a worse job of cataloguing experience than descriptive items. It is precisely through the retention of descriptive language that the measurement tool (the *epoché*) aligns with the thing studied (experience).

In clinical research, the importance of establishing congruence between measurement and construct is particularly significant, as the results derived from the study feed into therapeutic interventions. For instance, Petitmengin et al. (2006) demonstrated that the emergence of experiences categorised as “fragility” indicated the commencement of neural desynchronisation that precedes a seizure. It is difficult to conceive how translating this qualitative description into quantitive data would serve any practical aim for either patient or clinician.

Nevertheless, an emphasis on expressive terminology alone may not distinguish E-NP from alternative qualitative approaches. However, one distinctive attribute of the *epoché* is its capacity for formulating descriptive categories of experience to help localise patterns of neural activity that would otherwise be discarded as ‘noise’. Indeed, Lachaux (2011) suggests that careful attention to the content of first-person reports is the only feasible route to localising currently unrecognised neural signatures. To this end, Lutz and Thompson (2003) used three novel, *epoché*-

acquired descriptions of anticipation to localise three novel patterns of neural activity. The Paris group reversed this sequence by guiding participants to attune themselves to experiences of which the neural correlate had already been established using EEG.

Typically, however, assessing a protocol's construct validity presupposes that researchers already possess an approximate knowledge of the thing investigated; this way, a verdict can be passed regarding the construct and the measurement tool's compatibility. However, if the 'construct' remains improperly defined, or its very existence unconfirmed, a seemingly insurmountable obstacle stands in the way of developing an appropriate measure. Measurement tools are devised in accordance with *current knowledge* of a phenomenon, utilising information that must be comprised of more than a vague summation of its nature. However, the open-ended approach exhibited by the experimental *epoché* implies that a 'construct' with largely as-yet unknown properties can still be the object of experimental investigation. If a neurological profile is localised, the *epoché* can be employed to guide participants to achieve greater awareness of its experiential correlate, and vice versa.

Furthermore, delineating specific profiles of cognitive activity from concurrent profiles represents a long-standing challenge in neuroscientific experimentation. We have spoken elsewhere of the general 'holism' of mind and brain and the problem this represents for the scientific method. For neuroscience in particular, parsing apart the various mental and neural events that overlap and entwine with each other has been described as the 'individuation problem' (Sullivan 2010).[19] Richaud et al. (2017) claim: "if the experimental paradigm is insufficient for individuating [a] discrete

[19] In chapter 1, we saw how drawing inferences from neuropsychopathology is useful for distinguishing between capacities.

cognitive capacity, the data will be unreliable for discriminating among competing hypothetical claims". As an investigative strategy, E-NP may be of utility here also. By guiding participants toward a circumscribed experiential profile, the experimental *epoché* aims to strip away the superfluous facets of the participant's experience and triangulate the experiences pertinent to the investigation. If successful, the experiential data that is acquired should accurately reflect their neural correlate and can thus be individuated from other, co-occurring profiles which occupy the same temporal place.

Therefore, whereas a more in-depth evaluation of the experimental ***epoché's*** construct validity must fall to future researchers, a cursory analysis reveals that the *epoché* may represent a promising way to descriptively disclose experiential and neurological profiles when such profiles are imprecisely defined, or where they co-occur with other, extraneous profiles that require careful individuation. However, the method employed in E-NP is relatively time-intensive. Therefore, to further support the ***epoché's*** validity as a neuroscientific measure, future research must test how appropriate it is for various experiential profiles and seek ways of cross-validating the acquired data.

III. Content Validity

While a measurement tool may adequately cohere with the construct under investigation, it may nonetheless be found lacking regarding other forms of internal validity. One such example is 'content validity'. In the cognitive sciences, content validity refers to the *comprehensiveness* of a measurement tool. If a measure accounts for *all* (realistically describable) features of the phenomenon in question, the criterion of content validity is satisfied. Thus, a measurement tool becomes

vulnerable to criticism on grounds of content validity if it is oblivious to important facets of the domain under investigation. For example, a proposed measure of intelligence that tests participants solely on their geographical knowledge is hindered by poor content validity: the measure fatefully neglects to test other determining factors of the domain under examination. Geographical knowledge could potentially represent *one* relevant *factor* in a person's intelligence, but a measure that tests for little else cannot also be called a measure *of* intelligence; the complexity of the 'construct' outstrips the sophistication of the measure.

In the cognitive sciences, as knowledge of a cognitive domain (e.g., intelligence, agency, affect) is accumulated, measures become more receptive to fullness of its 'content' and, thus, are able to test for such factors. To draw upon the analysis of empathy provided in chapter 3, if a measurement tool is blind to the embodied, non-inferential and prereflective facets of empathy, the measurement's 'content validity' might, on some accounts, be justifiably called into question. Here, the importance of astutely 'operationalising' our 'construct' (e.g., 'empathy') is evident, as an "operational definition is built directly into the design of an experimental paradigm" (Sullivan 2015). As argued above, operationalising empathy as a mental operation defined exclusively by an act of intending-the-other in a *theoretical* manner inadvertently concealed vital information regarding how the brain engages in social understanding in other cases.

Thus, a measure cannot detect the full range of a cognitive domain's expression if particular presuppositions impede the recognition of some of its defining elements. In certain cases, applying phenomenological descriptions to experimental data uncovers structural layers of a domain that may have been previously understudied. In turn, these insights can be worked into experimental designs which are then made

receptive to these newly discovered factors. For instance, a neurophenomenological analysis of mirror neurons supported the hypothesis that MNs would be sensitive to contextually-embedded intentional actions. Iacoboni et al. (2004a) tested this hypothesis by including environmental context in an experimental design, finding that MN responses were sensitive to environmentally congruent actions. Thus, a theoretical formulation of the subject matter flows downstream into experimental design, while an on-going process of knowledge accumulation determines how theoretically comprehensive the construct itself is.

A paradigmatic example of content validity is known as ‘symptom correspondence’. Through interpreting neurophysiological data through a phenomenological lens, new ways of conceptualising symptoms become viable. However, it is erroneous to assume that all symptoms are surface visible. People with autism can display unambiguous empathy deficits, but interpretations of their cause differ. One theoretical model of empathy might speculate that the deficits lie in an inability to interpret another’s actions conceptually, which seemingly falls short of a complete picture. If empathy is (partially) constituted by a non-inferential understanding of intentionality achieved through perceiving actions, a diagnostic measure can (at least hypothetically) be developed to test for this ability’s (in)existence.

Thus, the way that a cognitive domain is conceptualised has vital ramifications for the way measurement tools used to test it are constructed. A measure inclusive of the so-called ‘primordial’ ways in which agents engage in cognitive acts should help in the formulation of more comprehensive measurement tools. However, it should be noted that certain measures seem unlikely to benefit from incorporating neurophenomenological findings into their design. Questionnaires, for example, are ill-suited to measuring pre-reflective experience, as they actively target the

respondent's *reflective* consciousness; it is, therefore, unclear how pre-reflective dimensions of experience could be incorporated into such a measure. However, research methods such as the interview and other qualitative and neuroimaging experimental designs may stand to benefit from the integration of (neuro)phenomenological research findings.

IV. Summary

From what we have observed, validity errors in the neurosciences appear more likely to emerge when pertinent information regarding the object of inquiry is overlooked or escapes a measurement tool's ability to capture it. As discussed, a neuroscientific study's validity might be impeded where the researcher unnecessarily quantifies first-person data, excludes contextual factors or remains blind to important dimensions of the subject matter. Weaknesses in such areas of the experimental process may ultimately rise to the surface in the form of conceptual or theoretical flaws.

Thus, neurophenomenological research findings might inform the design of measurement tools and experimental protocols as to better accommodate the object of investigation, even in protocols that are not explicitly neurophenomenological. In practice, a compromise must be negotiated whereby incorporating phenomenologically-derived notions work alongside the epistemological and procedural norms of the scientific method.

It should be reiterated that not all neuroscientific research programmes stand to gain from phenomenological contribution, so it is crucial to attempt to systematise a way of detecting problems amenable to neurophenomenological methods or insights. Indeed, whether or not adopting a phenomenological approach is proper to the goal

pursued helps determine whether a phenomenological or non-phenomenological approach is necessary. This factor will be examined next.

Part 2

I. Introduction

Phenomenology's 'point of insertion' into neuroscientific practice is, to a large extent, determined by the specific requirements of the goal pursued. Outlining the optimal stage in normative neuroscientific practice where a phenomenological contribution might be appropiate helps to establish which kind of research topics should animate the sub-discipline. Indeed, the neurosciences already encompass a broad range of topics and methods. As such, neurophenomenology can lend a conceptual or methodological hand to the neurosciences in a variety of formats. From the three paradigmatic research programmes analysed above, which fundamental principles can be extracted to gain further clarity as to the compatibility between specific phenomenological tools and specific neuroscientific research initiatives?

The foremost determining factor depends on the kind of neuroscientific protocol adopted. Neuro*psychology* places special emphasis on studying the relationship between brain, cognition and behaviour through examining neurological disorders. Cognitive neuroscience attempts to link *theoretical* accounts of cognition with *experimental* results targeting brain and behaviour (Standage and Trappenberg 2012). More philosophy-heavy branches of neuroscience posit higher-order theories to (operationally) define a specific cognitive domain in the form of a large-scale

model by recruiting principles from other fields, such as evolutionary psychology or neuropsychoanalysis.

In principle, neurophenomenology is equipped to fulfil each of these functions while adhering to the same standards of evidence operative in parallel neuroscientific approaches. Firstly, it should be reiterated that the cognitive-experiential dimension, the prime locus for any phenomenological contribution, is oftentimes an inseparable element of *non*-phenomenological neuroscientific practice. As Varela (1996) and Zahavi (2003) note, few neuroscientists are committed to the presumption that folk-psychology, ordinary language or computational metaphors represent a boundless repository of descriptive terms for detailing the 'cognitive correlate'. However, this does not condemn the neurophenomenologist to inevitably adopting a critical, 'outsider' stance in juxtaposition with 'normal' neuroscientific practice. Nevertheless, the onus is on neurophenomenology to showcase how its own contributions are not easily replicated in parallel approaches.

The three neurophenomenological approaches identified above synthesise phenomenological and neuroscientific evidence in different ways and at different junctures of the research process. Identifying *how* and *where* a neurophenomenological approach can strike its greater benefit will help underscore how neuroscience and phenomenology can be functionally integrated on a reliable and systematic basis. Therefore, further developing our taxonomy of neurophenomenological approaches should focus both on *how* the evidence is combined and, perhaps more importantly, to which end. Where phenomenology locates its 'entrance' into neuroscience ultimately hinges upon which of its methodological attributes are applicable to select research initiatives. This factor is discussed below.

II.i Interpretative Neurophenomenology

In interpretative neurophenomenology, the phenomenological dimension is somewhat 'inferred' from what is provided, or indeed from what is absent, in an item of empirical literature. I-NP's success hinges on its capacity to explicate critical elements of an empirical study's research findings. The empirical evidence that I-NP interprets (the explanandum) may constitute a completely separate endeavour, with the neurophenomenologist acting as an independent adjudicator. Alternatively, the neuroscientist themselves may recruit phenomenological descriptions of experience to elucidate their own findings. Therefore, I-NP exerts the majority of its influence at the level of *analysis* rather than that of *method*. That is, while the experimental protocol or case study eschews incorporating phenomenology into its design, the study's concrete results are elucidated and contextualised by cross-referencing them with phenomenological philosophy.

In Merleau-Ponty's (1945) analysis of Goldstein and Gelb's case study, phenomenology exerted a two-fold influence. The first operated by reformulating a pre-existing psychological construct (body schema), while the second through (re)interpreting clinical findings that showcased the body schema in breakdown. Again, phenomenology exerted no influence over the original data collection; the diagnosis and behavioural assessments of patient Schneider were independently supplied. Merleau-Ponty's main innovation lay in providing a fine-tuned 'model' of intentionality designed to contextualise, and thereby explain, Schneider's symptomatology. The phenomenological distinction between the 'lived' and 'objective' body, and the phenomenological notion of projection, found new life as neuropsychological *explanations*, purportedly through illuminating Schneider's

pathological behaviours by articulating otherwise unnoticed distinctions in their intentional orientation.

Similarly, Gallagher and Cole (1995) demonstrated how phenomenological accounts of intentionality can inform the interpretation of a neuropsychological case study. Gallagher (a phenomenologist) and Cole (a neuropsychologist) developed upon Merleau-Ponty's distinction between body image and body schema in their assessment of I.W, a patient with severe proprioceptive deficits. As in Merleau-Ponty (1945), the symptoms were explained by recourse to a phenomenological analysis of motor-intentionality. The authors claimed that proprioceptive deficits differently affected both body image and body schema, with patient I.W supposedly substituting the former for the latter. In this instance, the 'interpreters' were closer to the source material than Merleau-Ponty, as Cole had personally interacted with and observed patient I.W in his capacity as a neuropsychologist, a factor which bodes well for this instance of I-NP research.

Arguably, I-NP's *modus operandi* extends even to instances where phenomenology's contribution is unambiguous though relatively minute. For example, Costantini et al. (2011) operationalise the broad Heideggerian term 'ready-to-hand' when labelling a distinction at the level of experience whereby the agent becomes newly receptive to an object's affording-features during an experimental manipulation. Behaviourally and neurophysiologically, this transition is detectable with measures appropriate to those two domains. However, by describing the 'cognitive correlate' with Heideggerian terminology, the transition becomes phenomenologically reportable also. Thus, phenomenology offers a suitable language for transcribing first-person experience where appropriate terms do not yet

exist, a function which may become increasingly necessary in light of the ever-increasing sophistication of neuroimaging techniques.

Strictly speaking, Costantini et al. (2011), did not incorporate phenomenology into their methodology; indeed, their results were publishable without mention of phenomenological terminology. However, because a phrase appropriate for describing a shift in the agent's intentional comportment was necessary, the term 'ready-to-hand' became seamlessly worked into the results' conceptual interpretation. Thus, it is a prerequisite that the empirical findings interpreted by I-NP must be capable of standing on their own epistemic feet. With I-NP, phenomenology is restricted to performing an interpretative *function*, typically in the form of an appropriate language for conceptualising 'consciousness' (or better: the person-world dynamic) in a way that approximates the nature of lived experience. As stated previously, adopting a mechanistic terminology may fail to confer the qualitative 'properties' integral to experience.

In sum, I-NP discloses one form of the relationship between phenomenology and neuroscience by showcasing how avenues of investigation established in one discipline (phenomenology) are effectively transferable to another (neuroscience). Could it be that phenomenologists and neuroscientists can labour quite independently on their own sets of problems, while some inherent commonality between them ensures the continuing prospect of a productive dialogue when the need arises?

Indeed, several of Merleau-Ponty's contributions to the Schneider case, that were also adopted in Gallagher and Cole (1995), originated in Husserl's *Ideas II*. Unlike Merleau-Ponty and Gallagher, Husserl developed these ideas without much

knowledge of (or interest in) inquiries into brain-damaged patients. Yet, this mode of inquiry informed subsequent neuropsychological studies, indicating a commonality between the two disciplines that sometimes requires a little work to drag to the surface.

I.ii Aligning I-NP with Research Programmes

A discernible, and perhaps not coincidental, commonality in the above cases is that a pivot to phenomenological descriptions of intentionality informed the empirical results. Descriptive accounts of intentionality developed by phenomenologists appear especially conducive with certain post-experimental interpretations of neuroscientific results. One possible reason for this conduciveness is that phenomenology is adept at highlighting the deep, structural elements that constitute illuminating differences between both intentional-objects and acts-of-intending. Therefore, an emergent theme from the above analysis of I-NP is that this neurophenomenological approach is a suitable candidate when some kind of *difference* requires articulation.

The investigative logic of psychological experimentation operates through manipulating particular variables and subsequently observing how said manipulations engender detectable differences in brain, cognition, and/or behaviour. It is certainly not unrealistic to imagine that important information concealed between experimental conditions is reportable in the language of intentionality. As Flanagan (1992) notes, one may be experientially insensitive to an object's content but informationally sensitive to it. Moreover, the distinction between intending another person through memory or imagination, or intending an object as either a useful tool or three-dimensional entity, may be crucial to the interpretation of an experimental

result, yet the distinction may remain opaque until phenomenology renders it transparent. The dyadic relationship between the intentional-act and its intentional-object seemingly structure the agent's cognition in profound ways and can make otherwise confusing empirical data more comprehensible.

Furthermore, a neuropsychological double dissociation is often viewed as puzzling because of the apparent similarity between behaviours that are retained compared to those that are lost. The "theoretical innovations" that scaffold neuropsychology (Marshall and McGurd 2010) derive from an aptitude for engaging in sometimes counter-intuitive (i.e., philosophical) forms of reasoning to render the dissociations intelligible through acts of conceptual contextualisation. Patients do not think and behave in a vacuum, so it is apparent to neuroscientists that cognitive-behavioural acts are structured according to a particular logic. However, successfully revealing this logic may oftentimes require the assistance of a methodology specifically designed for such a purpose (Martin 2005).

Thus, revealing the mind's 'intentional logic' could provide a vital clue to as to why, for example, a patient can remember faces but not imagine them. Similarly, detectable differences between clinical and non-clinical populations may be articulatable in phenomenological-intentional terms. We might interpret the difference between the depressed patient's concept of self as ultimately an intentional difference. Moreover, other phenomena, including what phenomenologists call the 'background', (that which structures the way intentional-objects show up) may represent a further conceptual tool useful for the interpretation of empirical results.

Overall, it appears that I-NP should be sensitive to *differences* as they exist in empirical findings and assume the function of both detecting and contextualising

them. These ‘differences’ may designate those between behaviours, experimental conditions, between clinical subjects and controls or even in cases of intra-individual variability. In each instance, a theoretical explanation for an empirically observable variation requires articulation, sometimes inviting a radical reformulation of the core material. Thus, in clarifying the intentional-referent, and the structural components to acts-of-intending, cognition and behaviour are themselves further clarified. Consequently, a study’s empirical results may become easier to interpret and thus yield richer information.

II.i Experimental Neurophenomenology

Experimental neurophenomenology is not explicitly wedded to utilising phenomenology to explain neuroscientific data. Instead, E-NP generates novel phenomenological *and* neurological data in the format of a cognitive neuroscientific experiment. In acquiring the phenomenological data, E-NP employs an operationalised version of Husserl’s phenomenological reduction, repurposed as a measure for accessing opaque or dormant dimensions of psychological (though not transcendental) experience. E-NP appropriates trace elements of Husserl’s transcendental-phenomenological reduction (i.e., an emphasis on immediate experience, suspension of theoretical ways of understanding phenomena) and exploits them toward the obtainment of subtle, categorical descriptions of experience.

Notably, the experimental *epoché*’s purpose is not necessarily interchangeable with that of other qualitative measures. For instance, the subject’s explicit beliefs are not targeted with the *epoché*, and such data are perhaps better captured with more traditional measures. Ideally, the phenomenological datasets that are acquired either

facilitate the recognition of novel patterns of neural activity or serve as ‘purified’ forms of first-person data (e.g., preictal experience) that can be correlated with the study’s neuroimaging data. That is, the experiential profiles that E-NP acquires are demarcated from concurrent experiential profiles so as to be free of ‘confound experiences’, mirroring analogous concerns in neuroimaging procedures that are resolved through comparable means.

In Petitmengin et al. (2006), the *epoché* enabled participants to access experiences characteristic of a circumscribed pattern of neural activity (desynchronisation surrounding the epileptic focus) that emerges prior to seizure onset. According to their analysis, this profile of neural activity had no pre-established experiential correlate, thereby justifying the employment of the *epoché* to measure it. Their findings were further supported by a validated prediction and the profitable application of their results to therapeutic measures, suggesting that supporting one’s research findings by pursuing external validation should be emulated by future adopters of E-NP.

In Lutz and Thompson (2003), the experimental *epoché* generated phenomenological descriptions that were then codified and compared with data from simultaneous EEG recordings. This comparative analysis helped localise patterns of (otherwise uninterpretable) neural activity because the novel experiential categories correlated with a commensurate neurological signature. Apparently, then, E-NP’s capacity for disclosing novel neurological or phenomenological profiles operates bidirectionally: establishing a profile in one domain can precipitate a discovery in the other.

Assuming this logic is correct, the experimental *epoché* represents a promising methodological candidate for ascertaining how newly-disclosed patterns of neurophysiological activity manifest in experience (and vice versa). Presumably, the experiential categories already uncovered by the *epoché* thus far are not exhaustive, and one might speculate to the existence of multiple neurological and phenomenological profiles that might become recognisable upon future application of the method.

Thus, while most neuroscientific disciplines assume a relationship between brain and experience, this does not imply that, while *neurological* structures have to be actively discovered, *experiential* structures passively fall into the researcher's lap. Approaching this same issue from a different angle, Hans and Northoff (2008) located the neural correlates of culturally-dependent experiences. We can infer from such findings that the neuroscientist's ability to orient themselves in the uncertain terrain of neurophysiological data depends significantly on their possession of well-defined experiential descriptors.

Obtaining accurate descriptions of experience seemingly permit the recognition of neural modifications commensurate with them; while such a proposition is not unique to neurophenomenology, E-NP brings this notion to the foreground. However, it is prudent for the experimental neurophenomenologist to pursue external validation for their phenomenological findings, as phenomenological data are (arguably) more susceptible to accidental generalisation than neurophysiological data.

II.ii Aligning E-NP to Research Programmes

The nature of the epileptic seizure ensured that it could be neither stimulated nor manipulated during the experiment. Experimentalists cannot (or should not) exert

any direct influence over the seizure and, as such, it might be argued that the preictal stage was studied ‘in itself’, even in the laboratory setting. Despite featuring the structure of an experiment, E-NP is not necessarily anchored to the manipulation of experimental conditions as is required by some protocols. Therefore, unlike I-NP, E-NP may be suitable both for experiments that feature multiple conditions and for those that feature no experimental manipulations and instead measure an experiential phenomenon as it occurs ‘naturally’.

Additionally, localising discrete patterns of neural activity and targeting their correlate with the *epoché* should, if possible, reveal first-person experiences as they are directly presented within the participant’s phenomenal field, not as they are represented in the form of beliefs and opinions. Overall, the *epoché* is useful for making sense of specific types of neurophysiological data that correlate with what might be called ‘non-conceptual’ (sensations/moods/affect) forms of cognition, rather than ‘conceptual’ (beliefs/theories/opinions) forms of cognition.

Furthermore, that the *epoché* disclosed experiences characteristic of a clinical condition indicates that E-NP is likely suitable for disclosing relatively unusual forms of experience. Broadly speaking, certain pathological experiences are relatively demarcated from the rest of experiential life. This factor perhaps eases their recognition and lessens the likelihood that they are confused with ‘confound’ experiences. On this basis, hallucinations, manic episodes, dissociative experiences and similar pathological phenomena might be considered as prime candidates for an E-NP design.

Additionally, what might be termed ‘experimentally-induced experiences’, such as those produced by trans-cranial magnetic stimulation or psychopharmacological

interventions might likewise be well-adapted to E-NP for similar reasons. However, inductions found between experimental manipulations may be equally adaptable to E-NP. For instance, one might utilise the *epoché* to investigate the experiential differences between intending an object as ready-to-hand and present-to-hand, as in Costantini et al. (2011).

Finally, Petitmengin (2009) labelled the experiences characteristic of the preictal stage as both ‘micro-temporal’ and ‘pre-reflective’. These labels designate a realm of experiential phenomena that are of short duration or are largely inaccessible to conscious awareness, respectively. Consequently, these dimensions of experience may be routinely unrecognised in neuroimaging work. Experiences indicative of symptom onset can be said to fit these labels and are of significant clinical value. Because patients may have greater ‘executive control’ during the moments immediately preceding onset, the *epoché* might be employable as a clinical tool to help patients resist succumbing to their symptoms fully. Indeed, Petitmengin (2009) reports that one of the therapeutic interventions developed from their research had some success in this very area. Thus, finding an external point of reference to cross-validate one’s findings, such as through applying them to therapeutic interventions, should be contemplated by E-NP’s adopters.

III. Constitutive Neurophenomenology

Like interpretative neurophenomenology, constitutive neurophenomenology provides conceptual support to existing empirical data. However, rather than illuminating a singular dataset, C-NP instead positions a broadly-defined ‘construct’ (elsewhere defined as ‘cognitive domain’) as its centre of gravity. By integrating complementary research findings from across phenomenology and neuroscience, the constitutive

neurophenomenologist aims to build a comprehensive picture of the domain investigated. If successful, one result of this procedure would be the creation of a positively framed model of the targeted construct, as articulated through recourse to its phenomenological and neurophysiological invariants. For instance, in chapter 3, we observed how combining several types of neurophysiological and phenomenological evidence permitted the hypothesis that empathy *is*, according to the logic of the C-NP model, an automatic, embodied, pre-theoretical act.

While I-NP is tethered to explaining a specific set of empirical results, and E-NP to generating such results, C-NP has a greater license to make bolder claims in its pursuit of an *operationalisation* of the domain in question.[20] It appears well-justified to claim that no single experiment is at liberty to assert what a cognitive domain actually 'is'. Without further analysis, Merleau-Ponty's reading of the Schneider case cannot lay claim to a comprehensive model *of* embodiment.[21]

However, by expanding its borders to include several phenomenological, clinical, behavioural and neurophysiological research findings, C-NP can mould cognitive domain *X* into the shape of a theoretical model. Modelling a cognitive domain according to some of its structural properties has important, large-scale ramifications for neuroscientific practice and adjacent disciplines, as "models allow us to explore the system-level consequences of experimental observations" (Craver and Kaplan 2014).

Accordingly, C-NP is not hostile to alternative neuroscientific models of the same construct. Indeed, C-NP models must remain relatively modest in their ambitions and

[20] An operational definition enables researchers to define and use a term (e.g., empathy) in a certain way.
[21] However, elsewhere, Merleau-Ponty's phenomenology could be labelled as a 'C-NP' approach.

receptive to alternative models that originate from parallel approaches. An evolutionary or psychoanalytic model can productively disclose alternative features of the very same domain (i.e., empathy), perhaps by reference to empathy's phylogenetic origins or the unconscious motivations behind empathising acts. Thus, C-NP is best conceived of as a lens through which otherwise opaque features of brain *and* experience can be made mutually explicable. As a theory-heavy approach, C-NP's claims are subject to the same standards of justification as in comparable neuroscientific models and must walk a tightrope between successfully extracting a theory from heterogeneous forms of evidence while avoiding excessively broad and bold claims.

Treating C-NP as a model-building exercise that follows a relatively standardised methodological procedure suggests that commonly shared features between different neurophenomenological models will likely emerge. Despite divergences in accounts provided by various phenomenologists, there is little warrant to denying the existence of emergent themes within the phenomenological canon. Among them, one may include what Husserl terms 'pre-theoretical consciousness' or what Heidegger terms 'primordiality'; roughly speaking, the way that agents engage their world as it is given directly and non-conceptually before reflective thought takes grip. On this basis, we might suggest that C-NP models should be capable of passing a 'face' assessment, a cursory evaluation that indicates whether it is genuinely phenomenological by evaluating the claims that it makes.

For example, if a neurophenomenological model of language operationalises language as a reflective act of consciousness that manipulates linguistic symbols solely for the purpose of functional communication, it may raise doubts whether this approach should be called phenomenological at all. Consequently, we might argue

that other neuroscientific models are better suited for articulating the *reflective* aspects of human consciousness (and its neural correlates) and, as such, should be utilised accordingly.

Therefore, one possible role for C-NP is that of articulating how the brain immediately understands (or better: *engages*) the world before reflective consciousness takes hold as its prominent modality of world-engagement. More specific detail regarding *how* the agent engages the world (i.e., through memory, as a temporally-situated being, etc.) can serve as a principle of classification for the cognitive domain under investigation (i.e., memory, temporality, etc.).

Thus, accurately and systematically articulating a cognitive domain's cognitive-experiential dimension should reliably indicate how neurological and experiential structures relate to each other in a *consistent* fashion. The contingent, empirical experiences of single individuals, if only contained within those individuals themselves, are of a reduced interest to C-NP. Instead, a cognitive domain's neuro-phenomeno-*logical* structure is viewed as something that is discovered, not constructed, much in-line with Heidegger's (1925/1992) early view of constitution. Translating this principle over to the cognitive sciences, we face the idea that phenomenological inquiry can lay claim to foundational characteristics of 'mind' in the shape of a theoretical model.

III.iii Aligning C-NP to Research Programmes

The topics addressed by C-NP should approximately map onto the broad areas of specialisation within psychology and neuroscience (what may be found as chapter headings in an undergraduate textbook): memory, language, perception, attention, and so forth. Conducting this type of research might begin by simply selecting a

cognitive domain and conducting a cross-disciplinary literature review. A neurophenomenological investigation into a cognitive domain, targeting, for instance, ‘spatiality’, ‘mood’ or ‘agency’, might commence by defining its subject matter from the bottom-up through careful attention to its phenomenological and neurophysiological characteristics and the ways in which they intersect.

Alternatively, as previously suggested, a neurophysiological discovery (e.g., MNs) might motivate a re-examination of the phenomenological literature as to operationally define a cognitive domain in accordance with new evidence. Historically, the earliest indications that a C-NP approach may be viable emerge when the theoretical implications of an empirical discovery appear conducive with an existing phenomenological account of a related topic. This initial compatibility spurs a renewed inquiry into a circumscribed domain and permits exploitable opportunities to rise to the surface. Recall that the discovery of mirror neurons led their discoverers to reject the prevailing operational definition of empathy because it appeared theoretically incompatible with the neurophysiological data. Gallese (2011) indicated that a comparable approach is likely viable with regards the discovery of peripersonal neurons.

Thus, C-NP targets a broad region of cognition-experience and investigates what its conditions of possibility are, culminating in a theoretical model that conceptualises its subject matter according to what might cautiously be termed ‘phenomenological principles’. For example, Schiavio (2012) offers an operational definition of ‘music’ outside of what she argues is the somewhat limited conception provided by mainstream psychology, appropriating accounts provided by Husserl and Merleau-Ponty to accomplish her goal. For example, she cites operational definitions of music as a “unidirectional stream coming from the environment”, or as a modern equivalent

to a mating ritual (as claimed by evolutionary psychologists; see Miller 2000) as unsatisfying for providing a comprehensive account of music.

By redefining musicality under a phenomenological lens, Schiavio reconceptualises "the musical object" by highlighting the importance of musical affordances, motor-intentionality and the integration between the musician and the musical performance. Reformulating the "musical object" is here central to the investigative strategy pursued and Schiavio's account is constructed to complement several instances of empirical data, thus allowing a phenomenological conceptualisation of musicality to become visible to neuroscientific investigation; indeed, Schiavio even designates her goal as "constituting the musical object". In this instance, Schiavio purportedly reveals the cognitive domain of musicality's constitutive structure by positioning its neurophysiological and phenomenological structures into a mutually explanatory relationship.

Furthermore, a C-NP account of a singular cognitive domain may assume several forms. Several authors have conceptualised temporality on a neurophenomenological basis, yet each model was provided in a slightly different format. Among them, Lloyd (2012) and Dorato and Wittmann (2020) highlight how an existential model of temporality provides fresh insights into how the brain engages time. On a different note, Varela (1999a) utilised Husserl's tri-partite structure of the present moment to understand the temporal structure of brain functionality generally. Elsewhere, however, Varela (1999b) adopted a Heideggerian account of temporality which alters the kind of neuroscientific evidence adopted into the model. Seemingly, then, C-NP can operationally define the cognitive domain 'temporality' quite heterogeneously and model the relationship between brain and time in a variety of equally acceptable formats.

Finally, a C-NP model must present some capacity in which its claims are falsifiable and amicable to modification in the face of new evidence. Moreover, where possible, C-NP should seek to support its claims by pursuing traditional forms of external validity; that is, by applying its operational definitions to areas of research known to adopt neuroscientific models for well-defined research purposes. Such areas include psychiatry, psychotherapy, developmental psychology, education, AI research and animal cognition research. By showcasing a unique way of conceiving a cognitive domain from the ground-up through the assimilation of phenomenological and neuroscientific evidence, several of the disciplines that circle the social and cognitive sciences stand to benefit from the unique kinds of theoretical models and operational definitions that C-NP provides.

Conclusion

An initial literature review observed that the field of neurophenomenology, while constituting a single disciplinary *genus*, encompassed a heterogeneity of diverse research methods. Indeed, researchers had often invoked the term 'neurophenomenology' in a blanket sense without adequate specification as to which procedural techniques were recruited or how the challenge of integrating phenomenological and neuroscientific evidence was surmounted.

To bring these issues to the foreground and refine their ambiguity, the discipline of neurophenomenology was sub-divided into three distinctive approaches. It was suggested that the most parsimonious way of classifying each approach was to underscore its *telos*. *I-NP* aims to elucidate independent evidence from the neurosciences by utilising phenomenological resources. *E-NP* generates phenomenological and neurophysiological data in tandem by implementing a specific experimental protocol. *C-NP* aims to theoretically model a broadly-defined cognitive domain by revealing its neurophysiological and phenomenological structural invariants.

Each category in this tripartite taxonomy represents a commonly-adopted, yet previously unclassified, methodological instantiation of neurophenomenology. In establishing this classification, we examined three separate methodological configurations in which phenomenological and neuroscientific evidence were productively synthesised towards a circumscribed research goal. An in-depth examination of three paradigmatic research initiatives, treated as emblematic of their respective categories, enabled us to extract guiding principles regarding each approach's internal logic, likely conditions of success and potential weaknesses.

These principles were deemed to apply to other research initiatives that occupy the same methodological category, and it was further suggested that their approach to evidencing their claims should, with some qualifications, be emulated by future researchers.

Furthermore, it was argued that not every neuroscientific research initiative is cohesive with each neurophenomenological approach, a reality that was partially concealed by the oft-imprecise usage of 'neurophenomenology'. It was proposed that, by clarifying which research goals are concomitant with each approach, future adopters of neurophenomenology will be able to better co-ordinate their research efforts. Additionally, we analysed how appropriating findings from all three neurophenomenological approaches might inform non-phenomenological forms of neuroscientific research, i.e., through the adoption of operational definitions. Thus, researchers who do not explicitly adopt neurophenomenology might nevertheless profit from its discoveries.

Taking stock of the diverse neurophenomenological approaches currently available and rendering their epistemological and methodological distinctions transparent might help to further establish neurophenomenology as an effective research option. Indeed, Gallagher and Varela (2003) already suggested that the neurophenomenological enterprise's success hinges on the astute categorisation of fertile areas for cross-disciplinary investigation. While some of the promising *thematic* areas of investigative convergence have been well-articulated elsewhere, less effort had been placed on extending this categorisation process to *epistemological* areas of convergence. Indeed, if Varela's neurophenomenology is in fact a "*methodological* remedy", a more pronounced emphasis on

neurophenomenology's methodological and epistemological composition was a timely contribution.

Subsequent research into the epistemology of neurophenomenology may potentially find it pertinent to further sub-divide the tripartite taxonomy offered here to feature a greater level of nuance. For instance, a neurophenomenological research programme might adopt an experimental design, yet not recruit the operationalised *epoché* as a measurement tool. Alternatively, further scrutiny might be afforded to the specific kind of empirical data that I-NP interprets, highlighting the difference between experimental protocols and case studies.

In the 25 years that have passed since Varela inaugurated the field of neurophenomenology, the notion that 'subjective' and 'objective' accounts of mind are irreconcilable has, arguably, increasingly lost currency the cognitive sciences. Indeed, the present analysis evaluated several instances in which evidence from both disciplines were positioned into a mutually illuminating explanatory relation. Having expounded some of the ways in which neuroscience and phenomenology can be jointly recruited in the service of a shared goal, the theoretical and epistemological terrain of neurophenomenology has, hopefully, been mapped out in greater detail. Charting this map to an increased level of sophistication shall likely be the by-product of further theoretical exposition as well as the continued accumulation of empirical research findings.

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