

Neurophenomenology and the micro-phenomenological interview

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Neurophenomenology, as defined by Francisco Varela (1996), offers a radical response to a recurring problem of neuroscientific research. This well-known but underrated problem consists in a methodological and axiological imbalance between the objective and the subjective. Indeed, the most efficient and quickest strategy neuroscientists use to promote their momentous advances consists in accumulating objective knowledge. They develop new techniques of imagery allowing high space resolution, or new devices of electric and magnetic recording allowing high time resolution, thus gathering an impressive corpus of anatomical and functional data about the central nervous system. Unfortunately, this considerable amount of information remains virtually clueless about mental workings until it is compared directly or indirectly with subjective data, namely to *what it feels like* to be someone who undergoes the corresponding neural processes. The direct comparison is performed by asking subjects to describe the experience they had during the probing of their brain. But this use of self-report has long been underdeveloped, poor in methodology, and used with great diffidence. In practice, it often reduces to some variety of yes-no questions, button pressing, or multiple-choice questionnaire, while the large body of expertise in qualitative research (Denzin and Lincoln 2005) is neglected. As for the indirect comparison, it amounts to a study of behavior, on the ground that the latter objective process compares easily with the objective data of neurobiology. But one should not forget that the motor phenomena of an organism acquire the status of a “behavior” only by due reference to lived intentions and feelings (Merleau-Ponty 1963), thus making it impossible to eliminate subjectivity from neuroscientific research altogether.

As a result of this acute want of subjective data, some lucid neuroscientists rightly complain that they have increasing difficulties in ascribing a sharp and well-defined mentalistic meaning to their own findings (Lachaux 2011). Conversely, other not so lucid neuroscientists commit a *petitio principii* when they deem it possible to consider objective neurobiological processes as the origin (or initiating cause) of phenomenal consciousness : “One does not generate consciousness this way, but rather *adds it* as a received ready-made further fact to the [objective] elements one wished to stick to” (Le Roy, 1956). Those who hope to show how phenomenal consciousness derives from objective neurobiological processes surreptitiously presuppose it from the very beginning. Consciousness, lived experience, is *present* before any theory about its genesis; it is indispensable as a primary resource to make sense of neuroscientific data even when it is believed to be secondary and derivative (Bitbol 2000, 2002, 2014).

Neurophenomenology aims at overcoming this nest of difficulties by a twofold move. Firstly, it invites researchers to develop their methods of inquiry about subjective experience with the same determination as the methods for obtaining objective knowledge (Depraz, Varela and Vermersch, 2003). It jointly advocates a permanent interplay between the two sources of information in order to buttress their progress on one another, or to feed one into the other (Gallagher 2003). Secondly, as a consequence of this newly established balance of methods, neurophenomenology puts an end to the standard ontological bias in favor of objectivity. It asks researchers to suspend the elusive quest of an objective solution to the problem of the origin of subjectivity, and clarify instead how the sharing of our subjective experiences is supported (yet not exhausted) by our effort of objectification (Varela 1999).

Is neurophenomenology a branch of naturalism?

What has been retained of neurophenomenology among specialists of cognitive science is usually less daring than the previous summary. The only practical consequence of their narrowly defined version of neurophenomenology is to invite experts of first-person approaches for short interventions in some laboratories of cognitive sciences, while avoiding the major conceptual shift that would ensue from challenging the ontological priority given to the third-person. Along with this minimal construal, the neurophenomenological strategy is only meant to contribute to the findings of a highly valued and

hegemonic objective neuroscience, by increasing the intensity of its connections with verbal reports of experience, and by taking advantage of them for clarifying the function of various objective biological processes (Thompson, Lutz and Cosmelli 2005). Instead of just documenting approximate correlations between a highly developed neuroscientific body of data and a poorly developed experiential knowledge, a minimal neurophenomenologist seeks detailed “mutual constraints” which require a sufficient development of first-person method to meet the requirement of a quickly expanding third-person knowledge. The minimal (or mild) neurophenomenologist expects that first-person data become sufficiently refined to ascribe meaning to the increasingly sophisticated information gathered by neuroscientific imagery or recordings. But at no point does she consider the option of ascribing an equal epistemological dignity to first- and third-person findings, since the first-person approach is here considered as ancillary with respect to the main thrust of empirical/objective research. In other terms, the minimal (or mild) neurophenomenologist anticipates that the iterative process of mutual improvement will be highly beneficial to the knowledge of mental and cognitive processes, yet with the persistent assumption that the objective status of such knowledge will thus be maintained or strengthened. For, in the standard framework of naturalism, subjective experience represents nothing more than a biased, distorted, and incomplete probing into an intrinsically objective process.

But doesn't this “received” mild conception of neurophenomenology arise from a lopsided interpretation of Varela's views? Hasn't Varela's claim that neurophenomenology is part of the project of *naturalizing phenomenology* (Petitot et al. 1999) encouraged the tenet that what he advocated was the outright readsorption of lived experience into an objectified nature? Many commentators concluded from the latter expression that Varela was among the supporters of the dominant naturalist paradigm. But an accurate analysis of what “naturalization” means according to him would dramatically alter this conclusion. Let's then examine the concept of “naturalization” more closely, by listing a few standard and non-standard readings of it; and let's try to locate Varela's interpretation within the resulting map.

The most common meaning of “naturalization” is *reduction*; essentially reduction of subjective experience to a fraction of the objective domain. Yet, one just has to shorten this sentence into, say, “reduction of the subjective to the objective”, to realize that there is something basically wrong with it. No

wonder that with such an awkward project, we are left with the so-called “explanatory gap” between neurophysiological processes and conscious experience. Naturalizing by reducing is doomed to category mistakes and theoretical defectiveness. This is why Varela could not retain this widespread concept of naturalization, and looked for alternative versions.

A second, subtler, meaning is inspired by Spinozist metaphysics. Instead of reducing the experiential domain to some physical domain, one considers that both have a neutral common ground. In Spinoza’s *Ethics*, this common ground is the substance “*causa sui*”. But in modern versions of this view, the priority is usually shifted from speculation about an underlying substance to description of an amplified method of knowledge. This is the case, for instance, in the method of “triangulation” advocated by Owen Flanagan. Triangulation is a pattern of knowledge in which the subjective and objective perspectives both focus towards a supposedly unique process. None of these perspectives claims any priority over the other one. Some underlying process is presupposed, just as in Spinoza, but this putative process is left outside the scope of the discussion, unlike in Spinoza. Varela’s version of naturalization bears some similarities with this one, because it also puts (to a certain extent) the experiential and physical domains on the same footing. But there are also major differences. One difference is that Flanagan’s idea of triangulation is verbally symmetrical but methodologically biased. Access to the physical facet of the neural process is *de facto* more developed than access to the experiential facet. By contrast, Varela tackled the problem of how to raise first person accounts to a level of faithfulness that could sustain comparison with scientific objective accounts. Another difference is that Varela discarded even the last remnant of the metaphysical picture that is still implicit in the method of triangulation. To him, it is in vain that one points towards a sort of “noumenon” underlying both mental and physical events. The mental and the physical should not be seen as two facets of some third reality, but as two ways of ordering and selecting aspects of a *single flux of lived experience* (Varela 1996). Taken together, these two shifts are likely to change completely the way one sees the problem of conscious experience, as we will show in the next section.

There is also a third meaning of “naturalization”. Here, naturalizing is tantamount to broadening our conception of nature in order to encompass the experiential domain, instead of shrinking our conception of experience in order to embed it within a narrow conception of nature. David Chalmers (2010)

thus advocated the idea that the basic furniture of the world (its ontology) should be expanded in order to include experience as a new kind of “property”. However, even though they share a commitment to a *fundamental status of mind* at its experiential level, neurophenomenology and property dualism bear important differences. The main difference concerns the exceptional position of experience in the system of knowledge, which is fully acknowledged by Varela, but not by Chalmers. How can we characterize this position? In a few words, conscious experience is not a thing or a feature that one *has*; it identifies with what one *lives*. It is not a thing or a feature that one may *know*, but what one *dwells in*. Accordingly, the experiential-mentalistic terminology does not point towards a definite domain of entities or properties, liable to categorization, but towards the distinctive fact of embodiment (Rudrauf et al. 2003), situatedness, or “being-there”. Let’s ponder upon the latter concept of embodiment, because it is somehow ambiguous and may trigger confusion. Being embodied here does not mean realizing that the center of perspective of experience is located within a certain body taken as an *object* of external perception. It means *identifying* with one’s own living and sentient “flesh” taken as a background presence underpinning any perception, including self-perception. In other terms, embodiment means that a subject identifies with her lived and self-perceived own-body (*Leib*, in Husserl’s German), not that she contemplates her object-body (*Körper*, in Husserl’s German) by a “view from nowhere”. We’ll henceforth convey this important feature by referring to “*lived* embodiment” instead of mere “embodiment”. At any rate, the insistence on taking into account dwelling beyond observing, self-situatedness beyond spatial location, being-there beyond being, is the reason why Varela did not endow his own stretching of the concept of nature with any ontological import. He rather focused on defining a broadened science wherein the *methods* of objective natural science are embedded as a particular case, with experience and trans-experiential dialogue as an all-pervasive atmosphere.

Deep neurophenomenology

Beyond this purely methodological prescription (which will be developed at length below), what is advocated by neurophenomenology is nothing less than an existential self-transformation which triggers in its wake a wholesale revamping of what counts as a problem and what counts as a plausible solution in the philosophy of mind. As early as 1976,

Varela was convinced that only a *mutation of our own mode of being* could allow us to overcome the mind-body problem. Later on, in his classical paper entitled “Neurophenomenology” (Varela 1996), he confirmed that addressing the hard problem of consciousness does not require anything like a clever theoretical move; instead, what one should seek is systematic avoidance of the “alienation from human life” which goes along with the deceptive search for an abstract *theory* of phenomenal consciousness. Accordingly, far from reducing to a mere professional tool for scientists, the broadening of our methodology of cognitive research to encompass the “mutual constraints” of first-person and third-person data was taken by Varela as a major step towards the desired “mutation of being”. But how can such methodological shift turn out to be so intense that it alters our perception of the very nature of the problem of consciousness? This can occur only if the methodological renewal starts from the very beginning, namely from a thorough phenomenological *epoche*. Indeed, the *epoche* tends to set aside any prejudice about what manifests in experience, and then to let it show itself unfabricated (this latter step is called the “phenomenological reduction”). In particular, standard dichotomies such as appearance versus reality, mental versus physical, subjective versus objective are suspended in *epoche*. They are not judged or explained, but merely described and unfolded. From the perspective of the *epoche* and the resulting phenomenological reduction, the proper departure point of any inquiry is lived embodied experience, which is neither real nor apparent, neither mental nor physical, neither subjective nor objective, but just *there*, just *lived through* (Ihde 2012). Even the joint genesis of objective knowledge and subjective acquaintance can be studied within this common ground of lived experience. Even the pre-conceptual and pre-discursive source of concepts and discourse are liable to an experiential investigation (Petitmengin 2007). The slogan of what can now be called *deep neurophenomenology*, by contrast with mild neurophenomenology, is : “all knowledge necessarily emerges from our lived experience” (Varela 1996).

In the atmosphere of the *epoche*, lived embodied experience is no longer seen as a problem, but rather as the medium from which solutions may arise. Experience is no longer construed as the byproduct of an objective process; on the contrary, objectivity is regarded as the byproduct of a systematic work within lived experience. For, in phenomenology, objective features are seen to originate from the effort of extracting invariants of lived experience, thereby generating a universal

kind of knowledge independent of individual, spatial and temporal situations, *but not independent of experience itself*. This kind of phenomenologization of nature is part and parcel of Varela's variety of "naturalization" of phenomenology.

Understanding the symmetry between the two reciprocal processes (phenomenologizing nature and naturalizing phenomenology) results from an effort to defeat what Varela (1996) called the "practical ignorance" (Varela 1996) that underpins standard naturalism, namely the underdevelopment of the reflective attitude which would reveal that any knowledge of nature is grounded in experience. Practical ignorance is replaced with practical knowledge by gaining the ability to articulate two styles of approaches which are inherent to the very workings of our minds, but which have not been developed to the same extent until now. The first approach is contact with experience, together with mutual recognition of the individual expressions of this experience. The second approach is extraction of features of experience which are shared and stable after compensation of possible alterations of the 'organs of perception', and which can be pointed towards or actively modified by any subject. The first approach is called first-person, whereas the second approach is called third-person. The first approach allows a direct sort of intersubjective agreement by mutual empathic understanding, whereas the second approach tends towards an indirect sort of intersubjective agreement *about* common objects (hence its name "objectivity"). Yet, as soon as the phenomenological *epoché* has been performed, one realizes that first-person and third-person are not two completely different species of knowledge, but rather two modes of orienting within one and the same lived experience. Once this realization has been obtained, the problem of the objective origin of phenomenal consciousness is likely to be perceived as irrelevant, even though it can still retain some importance as a step in the circular interplay of phenomenologizing nature and naturalizing phenomenology (Velmans 2009, chapter XX). No solution has to be given to this problem "within its original settings" (Varela 1996), since the standard naturalistic settings is precisely the source of the *illusion* that there is a problem at all. Only a methodological "reframing" and an existential dissolution of the problem are needed: a methodological move towards the full range of epistemic attitudes (contact with experience as much as search for invariants); and an existential dissolution which derives from the recognition that "lived experience is where we start from and where we all must link back to, like a guiding thread" (Varela 1999). The so-

called “hardness” of the “hard problem” then boils down to the hardness of changing our conception of science in order to let it encompass its lived source, not only its objects and achievements. This hardness can easily be softened (i) by serious training to the phenomenological exploration of experience; (ii) by the completely renewed and broadened conception of science which is favored by such training.

As a consequence, a series of criticisms against Varela’s claim of having properly *addressed* the hard problem of consciousness is immediately defused. Let’s consider the most widespread objection. According to it, establishing mutual constraints between first- and third-person accounts of mental workings is not sufficient to close the “explanatory gap” between neurobiological processes and phenomenal consciousness. At any rate, this does not close the gap to a larger extent than a mere statement of the neuro-experiential correlations would (Bayne, 2004). To be sure, neurophenomenology is unable (and unwilling) to afford the sought *explanation* of the origin of consciousness in neurobiological processes. However, this is not due to its defectiveness, but to the definitely phenomenological stance it adopts. From a phenomenological standpoint: (i) phenomenal consciousness is not an *explanandum*, but a glaring *datum* and a basis for any explanation; (ii) neurobiological processes are not part of “what there is”, but a particular set of phenomena selected on the basis of their invariance with respect to a broad range of experimental situations; (iii) the remarkable concomitance between neuroscientific phenomena and certain contents of consciousness is not to be interpreted in terms of one-directional causality. It should rather be understood within the *continuum* of what shows itself, as a joint manifestation of the propriocepted own-body and the exterocepted object-body (*Leib* and *Körper* in Husserl’s German), by due analogy with the concomitance of the felt decision to move an arm and the empirical observation of this move (Merleau-Ponty, 1963 ; Bitbol, 2014). Realizing thus that the urge for an explanation of the “material origin” of phenomenal consciousness is ill-founded, turns out to be at least as good as elusively dreaming of such an explanation.

At the heart of the neurophenomenological method: studying experience

As we have just seen, a crucial demand of the neurophenomenological program consists in lifting the ban that until

now excluded lived experience from the field of scientific inquiry. However, accessing lived experience raises the question of the investigation method, and of the reliability of its results. Introspection has been accused of distorting, reifying or disrupting experience. Introspective reports have been accused of being non reproducible and therefore non verifiable, because of the singular nature of experience. If it were true, this would prevent introspection from achieving the status of a science, since reproducibility is the foundation of scientific validation. But if it turned out to be wrong, as we believe, this would not only increase the methodological resources of cognitive science, but also overturn the current privilege of third-person data, together with the construal of phenomenal consciousness as a secondary byproduct of some objective process.

The article that has contributed most to discredit introspection, is an article by Nisbett and Wilson published in 1977. The two researchers drew from a series of experimental studies the conclusion that subjects “tell more than they can know” about themselves, and have no introspective access to their cognitive processes. A Swedish team of cognitive scientists (Johansson et al. 2006) recently tried to challenge these conclusions through the following experiment: the experimenter shows the participants two pictures of women’s faces and asks them to choose which one they find the most attractive. Immediately after, she shows the selected picture again and asks them to explain the reasons for their choice. But in some cases, the picture which is re-presented is the one that was not chosen. Surprisingly, the participants detect the trick in only 20% of cases, and in the remaining 80% of cases, provide an explanation for the choice they did *not* make. This result seems to confirm that we have no introspective access to our choice processes, and by extension to all our cognitive processes. We decided to reproduce this experiment, yet introducing in some cases, between the moment of the choice and the moment the subjects are shown the wrong picture, an “*elicitation interview*” where the participants are helped to describe their choice process, through neutral but nevertheless precise questions, by an expert interviewer. In the trials where subjects did not undergo the interview, the results are similar to those of Johansson. However, in the trials where subjects were assisted in the description of their experience, they detected the substitution in 80% of cases, thus reversing the original proportion of “fooled subjects” (Petitmengin et al. 2013).

This experiment provides us with two important results. First, the low rate of detection of the substitution by unguided

participants confirms that naïve descriptions of our choice processes are usually unreliable. However the high rate of detection of participants who are guided retrospectively in the description of their choice shows convincingly that they perform a specific inner act, which enables them to access their experience of choice and disclose the manipulation. This act is the recall of the experience of choosing, which is regularly triggered, refreshed and assessed by the interviewer in the course of the interview. The high rate of detection then shows the efficiency of this act and therefore the reliability of the memories on which the descriptions rely, which strongly bears out the validity of these descriptions.

A second important result is that unguided participants, even when they are not fooled, only provide scanty descriptions, such as “I chose this one because she had a nice smile”. They remain focused on the *what* or the *content* of their choice, namely the chosen – or unchosen - face. By contrast, guided participants provide very detailed descriptions of *how* they chose, of their choice *processes*. For example, they described the chronology of exploration of the features of the faces, or the fleeting inner images that were evoked by the pictures, or the subtle inner feelings that were used as choice criteria (3000 words for the guided reports, *versus* 200 words only for the unguided reports). These detailed descriptions are a consequence of inner acts of redirection of the participants’ attention from the content of their choice to their choice processes, which are triggered regularly and carefully by the questions of the interviewer in the course of the interview. The experiments of Nisbett and Wilson, like those of Johansson *et al.*, whose subjects were not performing these acts, cannot therefore be considered to have discredited in any way the possibility of experientially accessing our cognitive processes in a disciplined way.

It is now time to document the “elicitation interview method” (also called the “micro-phenomenological interview”), which has been used to validate retrospective recollection and description of one’s own lived experience. This method draws its inspiration from Husserl’s phenomenology. But it also provides concrete techniques to collect disciplined descriptions of experience and identify its generic structures, which are not explicitly documented by philosophical phenomenology. Initially, the elicitation interview method was developed to help persons engaged in professional practices to become aware of the implicit part of their mental or physical actions (Vermersch, 1994/2014). It was then adapted to the domain of cognitive science research for describing the microdynamics of

the experiences associated with any kind of cognitive process, including manifestly embodied processes such as perception or emotion (Petitmengin 2006). The purpose of an elicitation interview is to help the subject redirect his or her attention from the content of experience to the dynamics of appearance of this content, which remains usually unrecognized, unnoticed, or “pre-reflective” in the phenomenological language, and then to describe it.

The first key to the elicitation interview consists in triggering a form of “phenomenological reduction”. This is done by patiently bringing the subject back to the singular experience she is describing, whenever she moves away from it towards comments, justifications, explanations and beliefs. Indeed, these comments do not correspond to what she is experiencing, but to what she thinks or imagines or believes about her lived experience.

In most cases, there is a temporal gap between the initial experience and its description. This allows systematic exploration of a past experience, by coming back repeatedly to its sequence and disclosing aspect after aspect of it. The second key to the elicitation interview consists in helping the subject to retrieve or “evoke” the experience, whether it is in the far past or only just over, by soliciting the process that Husserl called “passive memory”). We are always in the process of memorizing what we live. But most of the time we do so involuntarily, without being aware of memorizing. For example you did not voluntarily memorize the first thought you had when you woke up this morning. But you may be able to remember it, if you come back to the concrete situation of this moment and let it unfold again. Since the process of passive memory develops unbeknownst to us, we do not fully know what we know. It is therefore impossible to retrieve this information through an unguided voluntary effort: how could you target a content you are unaware having memorized? However it is possible to foster the spontaneous unfolding of the memory by retrieving the concrete, especially sensorial, context of an experience. A sensorial trigger (of which Proust’s “madeleine” is a famous example) enables the emergence of the whole memory in all its qualitative, emotional and cognitive dimensions. This phenomenon was well known at the end of the nineteenth century under the name of “concrete” or “affective” memory. In the context of an elicitation interview, the subject is helped to retrieve precisely the spatio-temporal context of the experience, and then the visual, auditory, tactile, kinaesthetic and possibly olfactory sensations associated with it, to the point that the past situation becomes more present for

her than the present situation is. A set of objective - verbal, non-verbal and para-verbal - criteria for checking the effectiveness of the act of evocation have been identified (Vermerisch 1994/2014, Petitmengin 2006), such as the spontaneous use of the present tense, the shifting and unfocusing of the eyes, the slowing of speech flow, and the appearance of co-verbal gestures: these clues show that the subject is re-enacting her past experience and coming into contact with its pre-reflective dimension.

The third key to the elicitation interview consists in triggering in the interviewed person, within the evoked experience, a series of accurate attentional movements. These acts of attention allow her to become aware of initially pre-reflective elements, notably inner micro-processes that are usually concealed by the absorption of attention into the content of experience. For example, the interviewed person may be helped to reorient her attention from the content of an emerging inner image to the dynamics of appearance, i.e. the genesis of this content. The rapid phases which precede its stabilization, and, at each phase, the subtle inner micro-gestures that are performed to elicit, stabilize, recognize, evaluate, rule out or enrich this image, may thus become the main focus of attention. To collect a diachronic description or such inner microgestures, the art of the interview consists in asking questions that guide the interviewee's attention towards the various moments of the process, which flag them up without suggesting any content. Some examples of questions of this type are: "how did you start?", "what happened then?", "When you did this?", "What did you do exactly?", "At the moment you felt this, what did you feel?". This kind of "content-empty" questioning enables the researcher to obtain a precise description without instilling her own presuppositions and creating "false memories". To sum up, the structure of an elicitation interview is an iterative structure which consists of helping the subject to evoke the experience several times, while guiding her attention towards a diachronic meshwork which is increasingly refined, until the required level of detail is reached.

The elicitation interview method enabled the detection of previously unnoticed microdynamics in many domains. For example loosening the attentional focus on the *content* of an idea (for instance a scientific concept) made it possible to discover a process of maturation, and micro-adjustments of attention facilitating the progressive transformation of a fuzzy and blurred feeling into a "clear and distinct" idea (Petitmengin 1999, 2007). In other words, the elicitation interview helped to

disclose an invisible microgenesis, of which the idea is only the visible and final result. While standard phenomenological descriptions of the famous “rubber hand illusion” usually focus on the final illusory impression (feeling a rubber hand as one’s own hand), the elicitation method made it possible to describe the experiential microgenesis of this illusion (Valenzuela *et al.* 2013). In the clinical domain, although epileptic seizures were considered previously as unpredictable, in-depth elicitation interviews have enabled epileptic patients to become aware of early signs announcing the arrival of an epileptic seizure. This confirmed on the experiential level something which had already been anticipated on the neuronal level (Le Van Quyen *et al.*, 2001): that seizures do not arise “like a bolt in the blue”, but are the visible result of a process that has started long before. Importantly, the awareness of this microgenesis is the key to new cognitive therapies for epilepsy, whose results are often better than those of the most efficient pharmacological treatments (Petitmengin *et al.* 2006): this clearly highlights the therapeutic potential of becoming aware of the microdynamics of lived experience. Elicitation techniques have also been applied in the pedagogical, managerial, technological, clinical, therapeutic and contemplative domains.

The elicitation interview method has been complemented with a method of analysis enabling the researcher to bring out the generic dynamic structure of a given type of experience, which is independent of the various experiential contents (Petitmengin 1999, 2006a). Each time we analyzed a corpus of microgenetic descriptions (whether it is about the emergence of a new idea, of an auditory perception, a feeling of surprise, a perceptive illusion, or a painful episode), we were able to detect such generic microdynamic structures. For example, irrespective of the content of the ideas whose genesis was explored, we were able to extract a universal structure of this very genesis.

Neurophenomenology in the making: epistemology and methodology

Among the experiential structures, one is especially important: the structure of the very process of becoming aware of our experience. Recognizing the structure of this particular process has two crucial epistemological consequences. One consequence is defusing the standard criticisms of introspection, which are directed towards a naive conception of introspection permeated with a representationalist and dualistic theory of knowledge (Petitmengin & Bitbol 2009; Bitbol &

Petitmengin 2013). These standard criticisms involve: (1) a disputable definition of introspection as observation of inner events; (2) correlative accusations of infinite regress or disturbance of psychical processes by observation, both triggered by the artificial separation between the subject and the object of introspection; (3) a norm of correspondentist truth which is inaccessible to introspective investigation due to the slipping in the past of the experience to be compared with “its” description, and (4) a commitment to a narrow form of objectivity, defined as *detachment* from the domain under investigation, and excluding a domain of intimate contact such as first-person experience. But a rigorous description of the introspective acts shows an entirely different picture. First, becoming aware of the pre-reflective dimension of experience does not consist in distancing from experience in order to observe it, by creating a fission between an observing subject and an observed object. On the contrary, it consists in reducing the distance from experience, in coming into closer contact with it. This act does not consist in diverting attention from external objects to an inner world either; it does not consist literally of intro-specting. Indeed, when we free ourselves from the absorption into the objects of experience in order to explore the experience of objects, the separation which is ordinarily perceived between an “inner” and an “outer” world proves very permeable or even non-existent (Petitmengin 2007). The so-called reflective process rather allows us to come into contact with the pre-reflective dimension of experience, an experience out of which the subject-object fission is (re)generated moment after moment. This being granted, the question as to whether a verbal report *corresponds* to experience, whether it *reflects* experience, loses its meaning and relevance. The validity of a description is assessed according to the authenticity of the process that generated it, not by comparing it with its hypothetical “object”. It relies on a manifold criterion of *performative coherence*: internal coherence in self-assessment and report, interpersonal coherence in the elicitation dialogue, and triangulated coherence in a network connecting introspective reports with experimental investigations. (Bitbol & Petitmengin, 2013).

The fact that this process of becoming aware of our experience is constantly structured, has another important epistemological consequence: it makes it possible to *reproduce* the description of a lived experience. To be considered as scientifically valid, an observation must be verifiable or falsifiable, at least potentially, by any other researcher. And in order to be verifiable or falsifiable, it must be reproducible,

which is possible only if a generic description of its very process of production is provided.¹ The structured character of the process of becoming aware makes it possible to provide a generic description enabling its reproduction, and it therefore lays down the foundations of a disciplined and rigorous study of lived experience.

Another consequence of the structured character of lived experience is that it enables a disciplined, explicit “circulation” between first and third person analyses, which is the principle of the neurophenomenological approach to cognitive processes. Experiential categories may indeed be used as standards for neuro-physiological analyses, enabling one to detect unnoticed structures at this level, and to ascribe meaning to them (Lutz 2002; Petitmengin et al. 2006). Conversely, the detection of new neuro-physiological structures may help in refining the awareness of corresponding experiences and discovering new phenomenological structures (Colombetti 2013).

The detection of experiential structures is thus the kingpin of the neurophenomenological program. As we saw previously, this program consists in developing rigorous correlation procedures by varying its various parameters as listed below.

(A) *Initiating dimension*: is the correlation search initiated by the identification of an experiential category, or by the detection of a neuronal structure?

(B) *Mode of identification of the relevant experiential variable*: is it identified *a posteriori* by comparing the phenomenological descriptions gathered after the experiments (Lutz 2002)? Or is it identified *a priori*, “front loaded” into the experimental protocol, the experimenter instructing the subject whose brain activity is recorded on how to perform the desired task (Gallagher 2003)?

(C) *Level of temporal resolution*: at which time-scale is the correlation looked for? Elicitation methods allow descriptions of precise inner operations, characterized by a very sharp temporal granularity. We consider that they provide access to micro-actions lasting about one-quarter of a second, which is the typical duration of a perception-action cycle. Only methods of neuro-electrical and neuro-magnetic recording offer the possibility of capturing such transient microdynamics.

(D) *Level of genericity*: is the correlation sought between (i) generic experiential structures, in which the specificities of individual experiences are erased, and (ii) generic neural signatures, in which deviations are eliminated as noise? Or is

¹ The description of the very process of production is a necessary condition of reproducibility; however we do not pretend that it is a sufficient one.

the correlation sought between singular experiences and their specific neural correlates? Does the correlation concern types or tokens?

The answer to the latter question also depends on the amount of spatial and temporal resolution of neuroscientific measurements. Electroencephalography (EEG) and magnetoencephalography (MEG) have a low spatial resolution (about two cubic centimeters), thus averaging neural signals from regions with heterogeneous functions. This makes it difficult, if not impossible, to relate these signals to the precise cognitive operations revealed by experiential microdynamics. On the contrary, functional magnetic resonance imagery (fMRI) assesses neuronal activity with a spatial resolution of a few cubic millimeters (Lachaux *et al.* 2003). This corresponds to the scale of modular organization of the human cortex, where neural populations tend to share the same function (e.g. word-form recognition, music perception, etc.). fMRI thus makes it possible to correlate the variations in the activity of these populations to the corresponding experiences, with high selectivity. But its temporal resolution is too slow to capture the experiential microdynamics below a second. New methods such as intracranial Gamma-Band Mapping (iGBM) however open new possibilities. By relying on the high frequency components of EEG recordings obtained in the brain of epileptic patients (Gamma-Band Activity or GBA, between 40 and 150 Hz), they make it possible to study the neural microdynamics with both millimetric and millisecond precision, and a very high signal-to-noise ratio (Lachaux *et al.* 2012). This allows one to correlate the cerebral microdynamics, trial after trial, with the microdynamics of the corresponding singular experience (Petitmengin & Lachaux 2013).

(E) Time analysis: furthermore, these new methods also allow a significant reduction of the time between the experience and the results of neural analysis, thanks to a real time analysis of neuro-electrical signals. This makes it possible to give the subject and the experimenter immediate feedback of the fine dynamics of the neural activity, in a visual or auditory form. First-person and third person data are thus combined within a single *locus*, the mind and experience of the subject, who can then directly detect correlations between the two phenomena. This is where the program of mild or minimal neurophenomenology links back to the program of deep neurophenomenology: even the neuro-experiential correlation turns out to be a fact of experience.

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