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# Consciousness and Cognitive Sciences

## Summary:

In this text the author reviews the recent history of the preoccupation with the study of consciousness within the field of the cognitive sciences. A general categorization of approaches is provided, running from the neuro-reductionist or objectivist positions to those that leave an explicit place for subjective accounts in the study of conscious experience. Positioning himself in this latter category, the author defines the task of neurophenomenology as the exploration of the modes of circulation between first- and third-person accounts of experience.

For this to be carried out, phenomenological method must be employed in order to produce and refine data from subjective experience. This data, it is argued, creates evidence that can then be related to empirical data, creating a relation of generative mutual constraint between first- and third-person perspectives on conscious experience.

## The recent consciousness boom

In the modern cognitive sciences the issue of human experience has surfaced recently under a peculiar turn which manifests itself as a sudden interest in the question of human consciousness. Let us be clear from the beginning: such an interest describes the situation in a field largely dominated by Anglo-American philosophical background which is, whether one likes it or not, an unavoidable ingredient of modern research in cognitive science, a recent scientific invention incorporating, as is known, the neurosciences, linguistics, artificial intelligence, anthropology and some aspects of experimental psychology(1). Within this literature, in fact, we are currently witnessing a boom concerning the so-called scientific study of consciousness: the number of books, articles and meetings on the subject has increased exponentially over the last few years(2). Why this current outburst after all the years of silence, when consciousness was an impolite topic even within cognitive science, the discipline whose vocation was to study mind?(3).

In a popular formulation, David Chalmers (1995, p. 201) points out that the study of human consciousness underlines the really “hard problem”, that is, the experience associated with cognitive or mental events:

*Sometimes terms such as phenomenal consciousness and qualia are also used here, but I find it more natural to speak of “conscious experience” or simply “experience”.*

After reviewing some popular functionalist explanations about cognition, Chalmers qualifies the remaining challenge as some necessary extra ingredient. The choice of the term is already revealing, for Chalmers seems to assume from the outset that the only avenue to bridge the gap between functional cognitive mechanisms and experience is to add some new theoretical principle. As we argue here, it seems that another fundamental alternative is to change the entire framework within which the issue is viewed!

In any case, “[t]he moral of all this is that you can’t explain conscious experience on the cheap”(4). We entirely agree, but the price to pay is heavier than most people (Chalmers included) are willing to concede. Again the central difficulty is that experience is “not an explanatory posit, but an explanandum in its own right, and so it is not a candidate for reductive elimination”(5). What is needed, he concludes, is a form of non-reductive explanation. Here again we concur, but one of our tasks will be to detail how different our options are from most of the cognitive science community.

To be sure, after the peak of dominance of behaviorism there had to be a conservative phase before cognitive science felt that it had some ground under its feet. More importantly, perhaps, was the style of the dominant philosophy of mind in the USA (where the initial elan of cognitive science took place in the 60s), which is intrinsically suspicious of subjective experience. Within this framework, significant developments in cognitive science have been accomplished almost exclusively within a cognitivist-computationalist or a connectionist perspective. Especially under connectionism one could discern a truly revolutionary idea of transitions and bridges between levels of explanation, better understood as a philosophy of emergence: how local rules can give rise to global properties or objects in a reciprocal causality. This gave new meaning to the traditional mind/body interface, which, in the form of cognitive processes as computationalist or connectionists schemes, made an array of specific cognitive phenomena (vision, motion and associative memory are prime examples) solvable in principle (if not solved). These developments, at the same time, created the very background for the “hard problem”, since they made consciousness appear devoid of any causal relevance. This is well illustrated in Ray Jackendoff’s (1987) pioneering book, in which the “phenomenological mind” (i.e. consciousness qua experience) is seen as projection from a “computational mind” (i.e. cognitive mechanisms) where all causality takes place. Thus the only conclusion he can come to is that consciousness “is not good for anything”(6).

Further, in parallel developments, new techniques for large-scale analysis of brain activity and neuropsychology have for the first time allowed us to ask direct experimental questions concerning complex cognitive correlates in action, such as mental imagery and emotions(7). The experiments involving such noninvasive on-line measurements are particularly interesting since they have led researchers to confront such questions as: can a subject’s report be taken at face value? What are verbal reports expressions of? These are basically experiential questions that already imply significant demands on the methodology under which accounts of human experience have to be approached in empirical research.

One day the intellectual history of the peculiar twists and turns of the problem of cognitive science and consciousness will be done thoroughly. But it has a déjà-vu aura to it, reminding us of the many swings of the pendulum in the past history of science, between rejection and total fascination with the scientific discussions about conscious experience. This can hardly be otherwise, since any science of cognition and mind, must, sooner or later, come to grips with the basic condition that we have no idea how the mental or the cognitive can be separated from our own experience. As John Searle aptly remarked in his own contribution to the boom, if there is a phase favoring strictly materialist theories of mind:

*[the philosopher] encounters difficulties. It always seems that he is leaving something out... [and] underlying the technical objections is a much deeper objection... [that] can be put quite simply: The theory in question has left out the mind; it has left out some essential feature of the mind, such as consciousness or qualia or semantic content... [Thus] if we were to think of the philosophy of mind as a single individual we would say of that person that he is compulsive neurotic, and his neurosis takes the form of repeating the same pattern of behavior over and over(8).*

We concur with the diagnosis: clearly we need some radical measures to compensate for this compulsive behavior. That is partly what this book does: setting the basis for a method to break the vicious circle of the attempts to “fix” it with yet another abstract, theoretical model.

## A three-way sketch

In order to focus our position more clearly the reader should now imagine this intellectual area as containing three positions, from right to left(9). We do not intend to provide an all-encompassing chart of the various viewpoints, but an occasion to place our work in this context of some who have published extensive arguments addressed to cognitive science (generally in book form) over the last few years. A warning: this is a chart of naturalistic approaches, that is, positions that each in their own way provide a workable link to current research on cognitive science. This excludes at least two streams of popular discussion. On the one hand views that take a traditional dualistic stance (à la J. C. Eccles). On the other hand calls for new foundations from the quantum mechanics proponents. These views seem extreme and we concentrate on those that are based on current neuroscience and cognitive science in some explicit manner.

Let us begin with the position on the far right, where we have put the ve vocal trend best represented by P. Churchland & Sejnowski (1992), F. Crick & Ch. Koch (1990), close to the spontaneous philosophy of many colleagues in neuroscience, and appropriately labeled as neuroreductionism or eliminativism. As is well-known, this view seeks to solve the hard problem by eliminating the pole of experience in favor of some form of neurobiological account which will do the job of generating an experiential count. Or as Crick puts it with characteristic bluntness: “You are nothing but a pack of neurons”(10), and elsewhere: “No longer need one spend time [enduring] the tedium of philosophers perpetually disagreeing with each other. Consciousness is now largely a scientific problem”(11).

In the middle position we have place for a variety of positions that can be broadly labeled as functionalists, and identified by Chalmers(12) as being the most popular ecology of ideas active today. Functionalism has been drastically preferred in cognitive science over the last 20 years with the strategy to replace the link between cognition and consciousness (the most immediate one in western philosophical tradition) with the link between cognition and its corresponding functional or intentional states. In the best of cases the problem of consciousness is assimilated with that of qualia for particular features of mental states. Thus the notion of experience becomes forcefully assimilated with that of cognitive behavior, propositional attitude, or functional role.

These views include a number of well-developed proposals including R. Jackendoff’s (1987) projective mechanism, B. Baars’ (1997) global workspace, D. Dennett’s (1991) multiple drafts, W. Calvin’s darwinian machines (1990), or G. Edelman’s (1989) neural darwinism. The basic move in these proposals is quite similar. First, start from the modular items of cognitive capacities (i.e. the “soft” problems). Second, construct a theoretical framework to put them together in a way that their unity amounts to an account of experience. The strategy to bridge this emergent unity and experience itself varies, but it is typically left vague since the entire approach relies almost entirely on a third-person or externalistic approach to obtain data and to validate the theory. This position seems the most popular in the current literature, and it represents an important segment of researchers in cognitive science. This popularity rests, it seems, on the acceptance of the reality of experience and mental life while keeping the methods and ideas within the known framework of empirical science.

Finally, to the far left in our imaginary map, we place the trend that interests us the most for our purposes here, and which can be roughly described as giving an explicit and central role to first-person accounts and to the irreducible nature of experience, while at the same time refusing either a dualistic concession or a pessimistic surrender to the question, as is the case for the mysterianists. This is in line with the identification of where the hard problem lies. As are the other general orientations, the group gathered here is a motley one, with odd bedfellows such as G. Lakoff and M. Johnson’s (1987) approach to cognitive semantics, J. Searle’s (1994) ideas on ontological irreducibility, G. Globus (1995) post-modern brain, O. Flanagan’s (1992) reflective equilibrium, and B. Baars’s theatre of consciousness.

What is interesting about this diverse group, within which we rank ourselves to a limited degree, is that even though we share a concern for first-hand experience as basic fact to incorporate in the future of the discipline, the differences are patent in the manner in which experience is taken into account. The phenomenological approach is grounded on a peculiar move to explore experience which is at the center of our work here.

### **Irreducibility: The basic ground**

Hopefully, this sufficiently clarifies the context for our ideas within the current scene in cognitive science. After placing ourselves squarely in the left sector, we now get closer as to why the topic of this book is of relevance to a cognitive scientist. The main point is the need to find an explicit circulation between and third person accounts, which amounts to a phenomenological Position (PERCHE' MAIUSCOLO?) fertile dialogue with cognitive science.

A phenomenological orientation starts from the irreducible nature of conscious experience. Lived experience is where we start from and where all must link back to, like a guiding thread. From such a phenomenological standpoint conscious experience is quite at variance with that of a mental content as it figures in the Anglo-American philosophy of mind. In the best of cases the problem of consciousness is assimilated with that of qualia, for some particular features of mental states. The notion of the mental becomes sneakily assimilated with that of cognitive behavior, propositional attitude, or functional role. But even cognitivist philosophers such as Ned Block (1996, pp. 456-9) have begun to re-introduce the distinction between the cognitive manifestations of consciousness and phenomenal consciousness in the sense of experience. But most authors are disinclined to focus on a principled distinction between mental life and experience, or manifest some suspicion about its status.

The tension between these two orientations appears in a rather dramatic fashion in Dennett's work. Sometimes he speaks as if he is talking about mental states when, in fact, he is referring to conscious states. For example, in Part 11, curiously entitled "An empirical theory of mind", he explains approach to consciousness as such:

*There is no such phenomenon as really seeming—over and above the phenomenon of judging in one way or another that something is the case... But what about the actual phenomenology? There is no such thing (Dennett 1991, pp. 364-5).*

Isn't it a curious stance to accept that there is such a thing as qualia since seeks (CI MANCA UN "IT"?) an account of their appearance, but in fact there really isn't? But we are not surprised since Dennett has already concluded with little effort (15 lines in a 550-page book) that Phenomenology has failed. He remarks:

*Like other attempts to strip away interpretation and reveal the basic facts of consciousness to rigorous observation, such as the Impressionistic movements in the arts [sic] and the Introspectionist psychologies of Wundt, Titchener and others, Phenomenology has failed to find a single settled method that everyone could agree upon (Dennett 1991, p. 44).*

This passage is revealing: Dennett mixes apples and oranges by putting Impressionism and Introspectionism in the same bag; he confuses Introspectionism with Phenomenology which it is most definitely not; and he finally draws his conclusion from the absence of some idyllic universal agreement that would validate the whole. Well, we do not demand "that everyone could agree" upon, say, Darwinism, to make it a remarkably useful research program. And certainly some people do agree on the established possibility of a disciplined examination of human experience. In a book that is in many other respects so savant and insightful, this display of ignorance concerning Phenomenology is quite telling. It is a symptom that says a lot about the

dominant (and largely unexamined) basis of the current consciousness literature.

Let us go back to a related key point that must be brought to the fore, clearly made by Searle(13):

*(...) much of the bankruptcy of most work in the philosophy of mind... over the past fifty years... has come from a persistent failure to recognize and come to terms with the fact that the ontology of the mental is an irreducibly first person ontology... There is, in short, no way for us to picture subjectivity as part of our world view because, so to speak, the subjectivity in question is the picturing.*

Where we part company with Searle's defense of the irreducibility of consciousness is in his inability to come to any conclusion about how to solve the epistemological issue concerning the study of consciousness (we will come back to his arguments below).

This is not unlike the limbo in Jackendoff's views, who in his own manner also claims the irreducibility of consciousness but when it comes to method is tellingly silent. He does claim that insights into experience act as constraints for a computational theory of mind, but follows with no methodological recommendations except "the hope that the disagreements about phenomenology can be settled in an atmosphere of mutual trust"(14). Mutual trust indeed! What is needed is a strict method and that is where both the difficulty and the revolutionary potential of the topic lie.

Following this line of thought it would appear that the development of new techniques in cerebral imaging have a paradoxical effect on how the psychophenomenological level is taken into account. The possibility of finely correlating an intellectual activity and the traces of it in brain structures could be seen as the triumph of the neurological level thanks to these new instruments. Nonetheless it is interesting to correlate the brain activity not just with the psychological level as defined by behavior, but also with the cognitive activity as the subject himself describes it in first-person terms. In this way brain activity can be related to a subtle, more functional level than the behaviorist approach permits.

## **Case studies**

It seems useful at this point to sketch a few domains of experience and mental life to illustrate more concretely how a circulation naturally appears between the cognitive study of a cognitive capacity and its experiential dimension. Needless to say, these case studies do not constitute proofs of what we are saying, nor do they preclude the examination of other examples the reader may be more interested in. Moreover, in recent years there has been a number of different studies where, while remaining well-grounded in the scientific tradition of cognitive neuroscience, the part played by the lived experience is progressively more important to the extent that it begins to enter inescapably into the picture apart from any interest in first-person accounts. The following are illustrative cases touching both on large and more local issues.

The evocation of these case studies tries to provide a concrete background for further discussion on a central concern that motivates taking into serious account the pragmatics of exploring human experience in the current situation of cognitive science. On the one hand we have a process of emergence with well-defined cognitive-neurobiological attributes. On the other, a phenomenological description which links directly to our lived experience.

## **Large issues**

Attention can be understood as one of the basic mechanisms for consciousness(15). In recent years studies of electrical recordings and more specifically of functional brain imaging have led to the identification of networks and pathways that provide a useful background for distinguishing conscious from non-conscious cognitive events. Three such attentional networks can be distinguished involving orienting to sensory

stimulation, activating patterns from memory, and maintaining an alert state. These results indicate that attentional mechanisms are a distinct set of processes in the brain which are neither located in a few neurons, nor is it merely the ensemble of the brain in operation. At the same time it is clear that the phenomenal distinctions between these forms of attention require detailed structural invariants of the varieties in which attention manifests to the subject (A first step in made by Steinbock & Depraz, forthcoming). A systematic study of the structures and strategies of attention is still a largely open task. But how is one to make the neural mechanisms relevant to consciousness unless such experiential counterparts can be sufficiently discriminated, recognized and trained?

### **Present-Time consciousness.**

Temporality is inseparable from all experience, and at various horizons of duration from present nowness to an entire lifespan. One level of study is precisely the experience of immediate time, the structure of nowness as such, or in James' happy phrase "the specious present". This has been a traditional theme in phenomenological studies, describing a basic three-part structure of the present with its constitutive threads into past and future horizons, the so-called protentions and retentions(16). In fact, these structural invariants are not compatible with the point-continuum representation of linear time we have inherited from physics. But they do link naturally to a body of conclusions in cognitive neuroscience indicating that there is a minimal time required for the emergence of neural events that correlate to a cognitive act(17). This non-compressible time framework can be analyzed as a manifestation of the long-range neuronal integration in the brain linked to a widespread synchrony(18). This link illuminates both the nature of phenomenological invariants via a dynamical reconstruction which underlies them, as well as giving to the process of synchrony a tangible experiential content(19).

Body image and voluntary motion. The nature of will as expressed in the initiation of a voluntary action is inseparable from consciousness and its examination. Recent studies give an important role to neural correlates which precede and prepare voluntary action, and the role of imagination in the constitution of a voluntary act(20). Yet voluntary action is preeminently a lived experience which has been well discussed in Phenomenology most specifically in the role of embodiment as lived body (chair, corps propre) and in the tight relation between lived body and its world (Leibhaftigkeit). Pain, for instance, is one of the most interesting qualia which reveals this dimension of embodiment most vividly, and its phenomenological study yields surprising insights both in body-image and its relation to neurophysiological correlates. Here again, a phenomenological analysis of voluntary action and embodiment is essential but only partially developed so far(21).

### **Local Issues**

*Perceptual filling-in* as used in visual science involves the spontaneous completing of a percept so that the appearance (i.e. a visual contour) is distinct from the physical correlate (i.e. discontinuous borders, as in the case of the popular illusory contours). The questions can be studied even at the cellular level, but raise more questions concerning experiential distinction of the appearance. In fact, the neuronal data on filling-in seem to correlate well with what phenomenology had concluded some time ago: there is an important difference between "seeing as", visual appearance, and "seeing that", a visual judgment(22). This is the opposite conclusion from Dennett's for whom consciousness is "all tell and no show" These are issues that can only be solved with the concerted convergence of external and first-hand accounts.

### **Fringe and center**

Interestingly for us here a number of studies have gone back to consider some traditional phenomenological

issues such as the two-part structure of the field of consciousness between a center and a fringe or, in Husserlian terms, between the object given in flesh and bone, its inner profile. And, more broadly, its inner and outer horizons. This mostly has come from the influence of William James and then of Aron Gurwitsch, but carried into modern laboratory protocols. In these studies the crucial experience to explore and target for refinement is the feeling of “rightness”, here standing for a summary of cognitive integration representing the degree of harmony between conscious-content and its parallel unconscious background(23).

*Emotion.* These past years have seen significant advances in the understanding of the brain correlates of emotions; the separation between reasoning and emotions is rapidly disappearing. Evidence points to the importance of specific structures such as the amygdala, the lateralization of the process, and to the role of arousal in emotional memory, both from examination of experimental protocols and from brain imaging. Yet these studies are entirely based on verbal protocols, and the questions of the competence for emotional distinction and the patterns of relations between mood, emotion and reasons need to be addressed explicitly at this stage of research(24).

Many advocates of this general analysis of the current state of cognitive research would nevertheless agree that some foundational issues still stand need of clarification. Chief among them is the problem of the relation of cognitive science to phenomenological data, which has, over the last few years generated a growing number of publications. At the core of the problem is concern that cognitive science somehow fails to account for such data, because of its explanatory perspective, whether computational or connectionist, or because of its methodological commitments. In other words the argument is that cognitive science does not constitute a full theory of cognition, in the sense that its most general tenets do not apply to a certain range of mental phenomena. In the felicitous wording of Thomas Nagel (1974), the worry is that cognitive science suffers from an “explanatory gap” vis a vis a certain part of its own field .

Perhaps the main contribution to cognitive science as a research domain of the present book, is the advancement of actual methods of phenomenological investigation for the purposes of the research itself, a topic completely absent from current discussion in any systematic manner, a first step in that direction having been made by Varela and Shear (1999).

### **The notion of phenomenological data**

The notion of phenomenological data itself merits a brief discussion here given its role in the present book. In the relevant literature the explanatory gap argument is variously put in terms of subjectivity, consciousness, qualia or experience. It is important to disentangle these different concepts and see how they relate with that of phenomenological data.

In spite of the variety of the terminology being used, a sort of consensus seems to have emerged around the idea that Thomas Nagel’s expression “what it is like to be” succeeds in capturing what is essentially at stake. Although the adequacy of this expression might be differently appreciated, it seems therefore appropriate to start with an elucidation of what it is meant to designate.

Clearly “what it is like to be” a bat or a human being refers to how things (everything) look when being a bat or a human being. In other words it is just another way of talking about what philosophers have called phenomenality since the Presocratics. A phenomenon, in the most original sense of the word, is an appearance and therefore something relational. By definition an appearance is indeed what something is for something else; it is a being for by opposition to a being in itself, to what something is independent of its apprehension by another entity endowed with apprehensive abilities.

Phenomenality certainly is a crucial fact for the entire domain of living beings. It is, for instance, plausible that an organism with a sonar system like the bat does not perceive what an organism equipped with a visual system like man can perceive: the external world looks different to both. It is similar, although to much a

lesser extent, for two individuals belonging to the same species.

Notice that phenomena fall into the two standard categories: internal and external. Broadly speaking, the notion of internal phenomena refers to how things happening in a subject look to that subject itself. It is clear for instance that feelings or judgements are not apprehended as located in the perceptual space where we locate our immediate environment. External phenomena, on the other hand, do have such a localization: when I see a house I see it outside “myself”. But according to the previous definition, these still count as subjective in the sense that they are what external things look like to a subject. As a matter of fact external phenomena usually are the prime examples mentioned when denouncing the insufficiencies of cognitive science with respect to “what it is like to be” elements.

Finally, when it is defined in this way, phenomenality does not differ in any substantial way from subjectivity, if by subjectivity we mean the subjective side of things, the way things are from a first-person point of view. Accordingly, it also sounds fair to say that what advocates of the explanatory gap argument complain about is that Cognitive Science is a theory of the cognitive mind leaving no less than phenomenality or subjectivity out, either because it does not attempt at accounting for it or because it fails to do so.

However these two notions stand in need of further refinement to really capture the point at stake. And this is where the notion of consciousness needs to step in. The progress of psychology as well as the development of psychoanalysis have made familiar the idea that something might happen for a subject, and in that sense be subjective, but nevertheless not be accessible to this subject. We naturally describe such a case by saying that the subject is not conscious of the phenomenon in question. A distinction must therefore be introduced between conscious and unconscious phenomena, or again between conscious and sub-personal subjectivity. The notion of consciousness itself clearly meant to first and foremost designate the fact that the subject knows about, is informed about, or, in other words, still is aware of, the phenomenon. The definition of consciousness as awareness accommodates perfectly well the distinction between external and internal phenomena: the division between internal and external consciousness, or between object-consciousness and self-consciousness, is indeed one of the oldest in the philosophy. It can be argued further that awareness, both in its internal and external form, is analyzable in terms of reflexivity, although this is a point of controversy(25).

It might be tempting however to conflate the two concepts of phenomenon and conscious subjectivity. But the notion of unconscious or subpersonal phenomenon is clearly needed: there are for instance numerous aspects of external things which we perceive without being aware of them. What the idea is being reproached with is its failure to explain why and how the internal mechanisms of cognition as it specifies them result in the internal and external phenomenon we are aware of. And these phenomena are precisely what phenomenological data captures and will hereafter designate.

It should be said that if this notion of phenomenological data seems quite close to that of experience as used in this book, it is somewhat different from the concept of qualia as it is mainly used in the relevant literature, although the two terms are often used interchangeably(26). By quale or qualitative aspect of mental event, analytic philosophers and psychologists usually mean a feature of what we are conscious of which is subjective to the point of being absolutely unique, as well as ineffable and incommunicable. Some authors actually find qualia so ineffable as to believe that the concept of qualia itself is not definable and can only be clarified by means of some sort of ostensive definition. Even if one agrees that there are qualia to be usefully defined, it is clear that they do not by far exhaust the range of phenomenological data: the two concepts can be considered as synonymous only under the condition that the notion of qualia be considerably extended to cover the full range of subjective conscious data. Flanagan (1992, Chapter IV) has for example recommended such an extensive use of the term.

## **Mutual enlightenment**

What is the motivation then, for cognitive science, to enter into the terrain of a disciplined exploration of human experience? The answer by now is clear: because it cannot progress to encompass the entire scope of mental phenomena without such decisive extension.

Fortunately the relevance of phenomenology to cognitive science has gained considerable visibility recently, so our developments here come at a fertile time. The point is to imagine what could be called a “mutual enlightenment”(27) or a “neuro-phenomenology”(28), that is, an explicit articulation between the first and third person perspective. In *Naturalizing Phenomenology*, Petitot, Varela, Roy and Pachoud recently discussed the pros and cons of these issues with a number of contributions<sup>29</sup>. In its most traditional form, the mind-body problem refers to the long and complex history of attempts to link the mental-cognitive and the brain-bodily domains. These kinds of linking propositions belong more to the traditional eliminativist or reductionist approach in a neuroscientific garb. The scope of the neurobiology-phenomenology relation broached here is quite different. The concern is made more precise by the perspective of mental phenomena and lived cognition which grounds phenomenology, which provides its empirical embodiment.

Phenomenological description can only provide evidence and analysis within the bounds of the phenomenological method. If one wants to develop an explanation appealing to sub-personal levels, the question is how phenomenological description will figure in or will provide constraints this causal description. Needless to say we exclude here the extremes of phenomenology being explained away, (a variant of eliminativism), or declared incommensurable (a dualist stance). So far, beyond these two extremes there seem to be two live options(30).

One approach is that this link as an isomorphic one. In other words: cognitive neuroscientist needs to take into account the phenomenological evidence in order to properly identify the right explanatory mechanisms on neural and subpersonal levels. This is a reasonable and productive option that has several variants depending on the degree or force of constraint that one lows phenomenology to have. In the reverse direction, phenomenology is considered more intelligible because it receives a causal explanation underlying appearances analyzed and a natural link to the bodily phenomena. But isomorphic option makes the implicit assumption of national boundaries: the job of phenomenology is to provide descriptions relevant to first-person phenomena. The job of natural science is to provide explanatory accounts in the third person. Both accounts are joined by a shared logical and epistemic accountability. But is this really possible or even productive? Is this not another form of psycho-neural identity theory with a phenomenological garb? This book also be read as a long argument against such an identity-theory. Phenomenology is more than a garb: it permeates the intrinsic nature of the phenomena to be studied and needs to be taken into account as such. Isomorphisms, even subtle ones, will not break the gridlock of the explanatory gap.

The second alternative is what we can call the hypothesis of mutual calculation through generative constraints. This is the spirit in which this book is written, even if we do not pursue any empirical domain in great detail. A first step is made by Lutz et al. (2002). The point here is that phenomenological analysis not only provides descriptions but it also provides evidence, and produces phenomenological data, not otherwise available. This is crucially dependent on the fact that experience can be, in fact, examined in a disciplined manner with a method we call in this book reflective reduction as a reflecting act proper and elaborated in detail in Part 1.

We now need to consider some of the other motivations for doing so. In this Section, our focus has been rather local: the cognitive neurosciences of today. Our intent was to see how the issues concerning human experience appear intrinsically in the dynamics of research itself and not by a purely logical argument. The consciousness boom in all its variety, attests to it, and in that sense this book fits squarely in the middle of the current debate. In the second section of this Chapter we now turn to the related, but historically autonomous discipline of psychology, whose vocation is the scientific study of human mind.

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## **Notes:**

1 Dupuy (1993;) Varela (1996)a.

2 Hameroff et al. (1996, 1997); <https://www.phil.vt.edu/ASSC/>

- 3 Varela (1996b).
- 4 Chalmers (1995) p. 208. His italics.
- 5 Ibid. p. 209.
- 6 Jackendoff (1987), p. 26.
- 7 Picton & Stuss (1994); Posner & Raichle (1994); Gazzaniga (1997).
- 8 Searle (1992) pp. 30-31
- 9 Varela (1996b).
- 10 Crick (1994) p. 2.
- 11 Crick (1996) p. 486.
- 12 (1995) pp. 204-9
- 13 (1992) pp. 95, 98
- 14 Jackendoff (1987) p. 275.
- 15 Posner (1994).
- 16 Husserl (1966); McInerney (1991); Gallagher (1998).
- 17 Dennett & Kinsbourne (1992).
- 18 Singer (1993); Varela (1995); Varela et al. (2001); Thompson & Varela (2001).
- 19 Varela (1999b); Depraz & Varela (2002b).
- 20 Libet (1985); Jeannerod (1994).
- 21 Leder (1991); Rizzolatti et al. (1997): 190-191; Depraz (2001b).
- 22 Pessoa et al. (1998).
- 23 Mangan (1993).
- 24 Damasio (1995); Davidson & Sutt (1994); Varela & Depraz (1999).
- 25 Zahavi (1998). Depraz (2001a).
- 26 Shoemaker (1975).
- 27 Gallagher (1997).
- 28 Varela (1996b, 1997).
- 29 Petitot et al. (1999).
- 30 Gallagher (1997); Varela (1996/1997).

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