Re-Viewing from Within

A Commentary on First- and Second-Person Methods in the Science of Consciousness

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> Context • There is a growing recognition in consciousness science of the need for rigorous methods for obtaining accurate and detailed phenomenological reports of lived experience, i.e., descriptions of experience provided by the subject living them in the "first-person." **> Problem** • At the moment although introspection and debriefing interviews are sometimes used to guide the design of scientific studies of the mind, explicit description and evaluation of these methods and their results rarely appear in formal scientific discourse. **> Method** • The recent publication of an edited book of papers dedicated to the exploration of first-and second-person methods, *Ten Years of Viewing from Within: The Legacy of Francisco Varela*, serves as a starting point for a discussion of how these methods could be integrated into the growing discipline of consciousness science. We complement a brief review of the book with a critical analysis of the major pilot studies in Varela's neurophenomenology, a research program that was explicitly devised to integrate disciplined experiential methods with the latest advances in neuroscience. **> Results** • The book is a valuable resource for those who are interested in impressive recent advances in first- and second-person methods, as applied to the phenomenology of lived experience. However, our review of the neurophenomenology literature concludes that there is as yet no convincing example of these specialized techniques being used in combination with standard behavioral and neuroscientific approaches in consciousness science to produce results that could not have also been achieved by simpler methods of introspective reporting. **> Implications** • The end of behaviorism and the acceptance of verbal reports of conscious experience have already enabled the beginning of a science of consciousness. It can only be of benefit if new first- and second-person methods become well-known across disciplines. **> Constructivist content** • Constructivism has long been interested in the role of the observer in the constitution of our sense of reality, so these developments in the science of consciousness may open new avenues of constructivist research. More specifically, one of the ways in which the insights from first- and second-person methods are being validated is by recursively applying the methods to themselves; a practical application of an epistemological move that will be familiar to constructivists from the second-order cybernetics tradition. **> Key words** • Lived experience, neurophenomenology, Francisco Varela, observer, introspection, cognitive science.

Introduction

The recent publication of *Ten Years of Viewing from Within: The Legacy of Francisco Varela*, a collection of papers edited by Claire Petitmengin (2009a), is a timely and welcome follow-up to Varela and Shear's (1999a) pioneering edited collection, *The View from Within: First-Person Approaches to the Study of Consciousness*. We would like to take this opportunity to evaluate critically some of the major contributions that the use of first- and second-person methods has made to the science of consciousness. Our specific aim is to push these develop-

ments forward by highlighting potential opportunities for further progress, as well as by indicating some of the pressing open questions and challenges that still need to be addressed.

Varela and Shear's (1999b) approach has gained some notoriety in the science of consciousness by being guided by three bold claims that remain contentious: (i) that lived experience is irreducible, i.e., that phenomenal data cannot be reduced or derived from the third-person perspective alone, (ii) that there is a necessary circulation between the first- and third-person methods, which requires an explicit establishment of mutual

constraints between them, and (iii) that becoming aware of lived experience is a skill that can and should be learned and practiced by anyone interested in improving our scientific understanding of consciousness. These claims are listed in ascending order of contentiousness in today's science of consciousness, and it is the final one that so far remains the most radical and least accepted.

Interestingly, all of the authors of *Ten Years of Viewing from Within* take this final pragmatic methodological claim seriously in one way or another. The volume thereby differs from previous ones (e.g., Varela & Shear 1999a; Jack & Roepstorff 2003; Roepstorff &

Jack 2004) in that it consists entirely of contributions from researchers who are actively practicing these methods themselves. Some authors supplement their second-person investigations by means of a first-person discipline, some focus on one or the other, but all of them try to obtain an accurate phenomenological understanding *in practice*, and it is this concrete foundation that provides the backdrop for their theoretical and methodological commentaries.

The implications of Varela's proposal should not be underestimated: it requires that the scientists themselves need to practice becoming their own best "instrument" if they want to systematically study lived experience as it unfolds in consciousness. Even the process of interviewing someone else about their lived experience, a "second-person" approach favored by many of the volume's contributors, demands a significant level of "first-person" familiarity with one's own structure of experience in order to guide the interview process. But how do we become aware of our experiences? And how do we describe this process of becoming aware in such a way that it can be practiced as a rigorous method? What are its generic structures and what are its epistemological implications? These are some of the central questions that the authors in Petitmengin's collection set out to answer, and they do this from "within."

The novel suggestion of *Ten Years of Viewing from Within* is that questions regarding the study of lived experience must be dealt with in a systematic manner in relation to the domain to which they relate, i.e., lived experience. For instance, it is no longer acceptable for a skeptic to reject the use of first- and second-person methods as being biased, untrustworthy and unscientific on the *a priori* assumption that the introspection and description of lived experience distort the experiences being reported. It may indeed be the case that an experience is changed in the process of becoming aware and describing it, but how do we know that this is the case? Can we quantify or limit the extent to which experience is changed, and does it even matter? If yes, then in what way and how can any detrimental interference be minimized?

These are precisely the kinds of questions that need to be investigated in order for the first- and second person techniques to constitute a progressive scientific research program of lived experience, and *Ten Years of Viewing from Within* demonstrates that researching the questions from "within" can be feasible and insightful. Indeed, one of the highlights of the collection is a sustained attempt by some of the authors to deal with methodological questions by turning their methods onto themselves, thereby inaugurating a "second-order" investigation of consciousness. The argument is that if we want to turn the process of becoming aware of and describing experience into a replicable scientific method, then it is necessary to become aware of and describe the very process of becoming aware. We will return to this recursive methodology at the end of this paper.

Overview of the paper

The rest of this article will unfold as follows. First, since the book *Ten Years of Viewing from Within* is dedicated to "the legacy of Francisco Varela," we will outline some of the important contributions Varela has made to the science of consciousness, especially in relation to the development of first- and second-person methods We motivate these contributions by means of a case study (see **Box 1**). This is followed by a summary of the primary methods and topics found in the book. We complement this review by providing a discussion of the ways in which these specialized methods can be integrated into a science of consciousness consisting of phenomenology, empirical studies and theory. We conclude by commenting on some of the themes of the book, in particular on the scientific status of first- and second-person methods when compared to traditional third-person methods.

Varela's contributions to consciousness science

Francisco Varela's scientific career began with his collaborations with Humberto Maturana in the "autopoietic" tradition of biology (e.g., Varela et al. 1974), and continued in the context of a loose affiliation with the "second-order cybernetics" and "constructivist" community of researchers

(e.g., Watzlawick 1984). Varela spent most of his career exploring the idea of autonomy in terms of complex systems theory, an idea that he applied to a variety of biological systems such as the single cell, the nervous system, and the immune system. However, he dedicated the last decade of his life, before his untimely death in 2001, to promoting an open-minded, rigorous and systematic investigation of lived experience in the cognitive sciences (see Thompson 2001 for an obituary).

The first milestone was placed by Varela and colleagues in 1991 with the publication of *The Embodied Mind: Cognitive Science and Human Experience* (Varela et al. 1991). This seminal book emphasized the role of an existential awareness of the scientist as a human being and placed insights of Buddhist psychology alongside the groundwork of an embodied cognitive science. It recognized that Buddhism offered a collection of systematic first-person methods that could help the cognitive sciences. Accordingly, even though the book's sustained appeal to meditative traditions is often ignored in favor of its European phenomenology view of embodied cognition and the "enactive" approach to perception, it should not be forgotten that Varela was instrumental in setting up ongoing collaborations between cognitive scientists and trained meditators, especially Tibetan monks (e.g., Hayward & Varela 1992). Not only was he influential in instigating collaborations between neuroscientists and meditators to improve our understanding of consciousness, he also did not shy away from tackling difficult topics that are at the heart of Buddhism but remain at the scientific fringe (Varela 1997).

This is not to say that Varela only focused on the first-person experiential side of consciousness science. While someone unfamiliar with Varela's legacy may wrongly get this impression from the explicitly one-sided focus of *Ten Years of Viewing from Within*, it is important to remember that he was also active in theoretical and empirical neuroscience as well. In fact, he was strongly involved in pushing the boundaries of the best neuroscience at the time, for instance in the development of a better understanding of the role of neural synchrony for cognition and perception (e.g., Varela et al. 2001; Rodriguez et al. 1999).

255

BOX 1: Why ask the subject? A case study

In a recent *Science* paper that received media coverage around the world, Dijksterhuis and colleagues (2006) set out to demonstrate the power of "unconscious decision making". They presented subjects with a list of car attributes, and then informed them that they would be asked to name the best car after an interval of 4 minutes. During this interval, participants were either engaged in an unrelated distracting task (the "unconscious" condition) or asked to consciously deliberate about which type of car they would like to choose (the "conscious" condition).

Interestingly, they found that in the case of complex decisions (i.e. those involving more attributes) participants did significantly better after the "unconscious" condition. The conscious deliberation phase, on the other hand, appeared to have a detrimental effect on the participants' ability to select the best car when many attributes were involved. The authors thus concluded: "it should benefit the individual to think consciously about simple matters and to delegate thinking about more complex matters to the unconscious" (ibid: 1007). Faced with difficult decisions in life, the authors seem to suggest, it is better to think less. (Note that this example nicely demonstrates that the findings of the cognitive sciences are not value neutral, as they have direct implications for how we should understand ourselves and how we should live our lives. Even more reason to take our lived experiences into account!)

However, a follow-up study by Waroquier and colleagues (2010) has cast doubt on the validity of this interpretation. When querying participants about their experience they found that 69.5% of them had chosen which car they found most desirable already during the initial presentation phase prior to the distraction/deliberation condition! But if participants have indeed made a conscious decision at that point already, then Dijksterhuis and colleagues' assumption that conscious or unconscious decision making could be contrasted during the subsequent phase turns out to have been invalid. Unfortunately, when designing the experiment it seems to have escaped their attention that in a study related to consciousness it may be beneficial to obtain some data about the participants' experience of the task. If it is essential that participants are conscious or unconscious of certain phenomena for the experiment to make sense, then we need to have some method of ascertaining whether this is indeed the case.

In order to answer these kinds of questions we can make use of second-person interview techniques. And if this is not within the capacity of the main experimenter, then at least they should have recourse to someone who is trained in eliciting detailed verbal reports from the participants. It may be countered that it would be too expensive to hire a professional interviewer for this purpose. But price has never stood in the way of potential scientific progress (for an extreme example think of the Large Hadron Collider). If a skilled interviewer is a necessary tool for the job then these costs will simply have to become part of project budgets, just like the way brain scans are currently financed in the context of psychology.

This complementary interest in phenomenology and neuroscience eventually led to the inauguration of neurophenomenology (Varela 1996), a novel research program that combines systems neuroscience with a pragmatic approach to becoming aware of our lived experience. Varela's own favorite example was the phenomenon of time consciousness, which he developed into an extensive case study that interlinked the emergence of a coherent ensemble of neural activity with the emergence of a lived temporal moment (Varela 1999b).[1] After this original "proof of concept," the methodological framework of neurophenomenology was taken up by others and has been successfully applied in studies of lived experience in health (e.g., Lutz et al. 2002; Lutz & Thompson 2003; Lutz 2002) and disease (e.g., Petitmengin et al. 2007).

Varela was acutely aware that if considerations of lived experience were to have an impact on the cognitive sciences, then the question of finding an appropriate method of becoming aware and describing it adequately was paramount (Varela & Shear 1999b; Roy et al. 1999). He realized that if the results of first-person inquiry were to be scientifically accepted then they needed to be systematically reproducible. He therefore required not only a better awareness of our experiencing as such, but also needed to develop a better understanding of the very process of becoming aware of our experience and describing it. Varela's extensive explorations of these complex methodological issues were published posthumously in the book *On Becoming Aware: A Pragmatics of Experiencing* (Depraz et al. 2003).

One of the central realizations from these final groundbreaking efforts is that the process of becoming aware is based on a precise sequence of mental gestures that needs to be applied in a skillful manner, and that expertise in performing these gestures must be learned and practiced like any other kind of skill. This is why Varela often spoke of the need for a "phenomenological pragmatics," a phrase he used to distinguish rigorous methodological investigations of experiencing from the all too common armchair reflections about the *a priori* possibility or impossibility of making use of first-person methods in the cognitive sciences. It is this specific pragmatic approach that defines the legacy of Varela in the science of consciousness, namely the continuing tradition of neurophenomenology, and that forms the departure point for most of the papers in *Ten Years of Viewing from Within*. We will examine these recent contributions more closely in the following sections.

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1 | A shorter version of this paper was also published in *The View from Within*, see Varela (1999a).

Viewing from Within: A methodological toolbox

For those who are not familiar with the phenomenological tradition in continental philosophy (see Gallagher & Zahavi 2008 for a recent accessible introduction), or who have been taught to believe that lived experience is irrelevant to cognitive science, Varela's preoccupation with the use of first- and second-person methods may appear perplexing. Indeed, given that the science of the mind is still afflicted by a widespread behaviorist hangover, having proudly replaced Skinner's boxed animal with an almost exclusive focus on the "brain in the vat," the very proposal of "viewing from within" is still viewed as unscientific by many.

However, this prevalent distrust appears to be largely contingent on cultural and historical factors (Vermersch 1999). Though it is reasonable to apply a degree of skepticism to insights gained by introspection, as would be applied to any other scientific results, the widespread and long-standing taboo surrounding first-person approaches cannot be reasonably justified. Surely it is our own awareness of the existence of our experiential lives that provides the necessary foundation and motivation for a science of the mind in the first place. In fact, the use of introspection is indispensable to modern psychology, although it currently appears under the guise of questionnaires and post-experimental debriefing interviews. Accordingly, the lack of an explicit investigation of the wealth of experiential detail in ourselves and others, and that is available to disciplined observation, may have retarded progress in psychology (Locke 2009).

However, once we realize that accurate descriptions of lived experience must be taken into account in the sciences of the mind, a proposal that many researchers in consciousness science are now increasingly prepared to accept, then we are immediately faced by a number of challenges. In particular, we need to know what methods are available for this task, how suitable they are for what is required, and what are their specific advantages and disadvantages. *Ten Years of Viewing from Within* takes important steps in this direction.

Primary method used	No. of papers	References
Explicitation Interview (EI)	5	Vermersch 2009; Maurel 2009; Petitmengin et al. 2009; Petitmengin & Bitbol 2009; Depraz 2009
Meditation and mindfulness	2	Genoud 2009; Philippot & Segal 2009
Focusing and Thinking at the Edge (TAE)	2	Hendricks 2009; Gendlin 2009
Descriptive Experience Sampling (DES)	2	Hurlburt et al. 2009; Hurlburt 2009
Neuro-Linguistic Programming (NLP)	2	Mathison & Tosey 2009; Andreas & Andreas 2009
Empathy and deduction	1	Stern 2009

Table 1: Summary of the primary methods employed by the authors in *Ten Years of Viewing from Within* (2009). *Note:* Even though Depraz's (2009) process of "becoming aware of an experience and describing it" took place in the context of a group of researchers, it is not clear to what extent an interviewer or others played a direct role in the unfolding of this process. Strictly speaking, her method might therefore be better described as a first-person approach to self-explicitation rather than as an example of a second-person Explicitation Interview as described in the other papers.

Primary topic explored	No. of papers	References
Second-person methodology	4	Vermersch 2009; Hurlburt 2009; Mathison & Tosey 2009; Petitmengin & Bitbol 2009
Practical applications	4	Maurel 2009; Hendricks 2009; Andreas & Andreas 2009; Philippot & Segal 2009
Phenomenological studies	3	Depraz 2009; Hurlburt et al. 2009; Petitmengin et al. 2009
Psychology (theory)	2	Stern 2009; Gendlin 2009
Buddhist meditation	1	Genoud 2009

Table 2: Summary of the primary topics explored by the authors in *Ten Years of Viewing from Within* (2009)

Breakdown of the contributions

Ten Years of Viewing from Within contains thirteen novel contributions by various authors, one reproduction of original work, and Petitmengin's editorial introduction. These papers can be grouped by primary method and topic of interest as shown in Tables 1 and 2 below.

Thanks to Claire Petitmengin's (2009b) editorial introduction, it is apparent that there is a common theme to many of the papers, despite being approached from a number of different methodological perspectives. All authors make it clear that the investigation of one's own lived experience is a skillful endeavor that requires a certain degree of expertise in becoming aware and describing the content of awareness. The challenge is to get a clear description of the actual experience that the subject is living through, and not of their ideas, beliefs, judgments or other indirect assessments about the experience. On this point the volume is in general agreement with those consciousness scientists who argue that there is a difference between introspection and measures of "metacognitive content" (e.g., Sandberg, et al. 2010; Seth 2008), but it goes further by requiring subjects to be skilled at becoming aware.

Of course, most subjects will not immediately satisfy this requirement, so it is

257

BOX 2: Introspection and evocation

"The whole of our life is surrounded by information that is acquired continuously in an involuntary, passive way. [...] I do not know it in the sense of not having reflective consciousness of it, but furthermore I do not know what has been memorized in me. One can thus understand one of the main difficulties of retrospective introspection, which is quite discouraging for anyone attempting it alone: not only do I have the impression that I do not remember, but in any case, it appears to me with near-certainty (a false near-certainty) that nothing is available to be recollected. The resulting conclusion is that it does not work, and that it is impossible to carry out research by this method! When in fact one has "simply" to create the conditions which enable the reflection of the lived experience." (Vermersch 2009: 41)

essential that the investigator is able to facilitate and guide this process (see Vermersch 2009; Hurlburt 2009). In order to do this effectively and to organize the resulting verbal descriptions, the investigator is required to have first-hand experience of the process of becoming aware and its possible misconceptions and, if possible, some familiarity with the particular type of lived experience that is being investigated (Petitmengin 2006). Accordingly, it is unsurprising that many of the second-person researchers who have contributed to this collection of papers are themselves actively engaged in some practice of becoming aware, such as Buddhist meditation (e.g., Petitmengin & Bitbol 2009). In the context of second-person interviews, having expertise in such first-person methods increases the interviewer's familiarity with the process of becoming aware and also aids their being present and engaged with the interviewee.

Two of the main second-person methods that are discussed in the book – the "Descriptive Experience Sampling" (DES) method by Russ Hurlburt and colleagues (e.g., (Hurlburt et al. 2009; Hurlburt 2009) and the "Explicitation Interview" (EI) by Pierre Vermersch and colleagues (e.g., Vermersch 2009; Petitmengin & Bitbol 2009) – show some similarity in gathering descriptions of lived experience by guiding the subject in the context of an interview, although there are some significant differences in style and emphasis (Hurlburt & Akhter 2006; Petitmengin 2006). The distinguishing feature of DES is that subjects are provided with electronic beepers that sound at random intervals during the day (approximately five to six times in 24 hours). When

the beeper sounds, participants are required to make some written notes about their experience at the precise moment before the beep. These notes then form the concrete basis for a guided interview at a later time, usually within 24 hours at most, in order to elicit a more comprehensive description of the moments before the beep.

By comparison, the EI method relies initially on the participant's memory to form the basis of the guided interview, particularly if the conditions for the relevant lived experience cannot be easily replicated during the interview context. However, it is well known that our memory is highly selective, and this poses methodological challenges for naïve introspection without the aid of a sophisticated method of explicitation (see **Box 2**). It is assumed as part of this method that with some appropriate guidance by the interviewer it may be possible for the participant to overcome this memory limitation by evoking and reliving the past experience in the present (Maurel 2009: 62-68).

The EI approach works especially well if one is interested in exploring a particular type of salient experience. But what if one is interested in the general constellation of experiences? In this case the use of a random beeper appears to be perfectly suited to eliminating the selective memorization bias of the participant. The DES method also provides the EI with a concrete singular lived experience that can act as a neutral entry point for a more in depth exploration by bringing the participant into the evocation state of reliving that particular experience. Here we would therefore have a merging of the DES and EI methods, a possibility that has not yet been discussed in the literature.

It is also worth noting that many contributions of the book relate to approaches used for personal development, training, and the therapeutic context (see "Practical applications" in Table 2). This is only natural given that these practical disciplines have retained a strong commitment to exploring lived experiences first hand. However, while a closer relationship between consciousness science and these fields is desirable and is likely to be mutually beneficial, great care must be taken when bringing them together. For instance, at least a third of the papers in the collection mention how these methods have helped individuals to overcome their specific difficulties, and so one may be misled into thinking that these methods are primarily intended for self-help, training and therapy rather than science. That these practical applications may be of benefit to individuals is surely a welcome side-effect. However, a method that happens to make you feel better does not necessarily exclude the possibility of distortion. One should therefore be aware that the phenomenological and scientific study of consciousness carries a different set of goals and methodological requirements.

At least from the perspective of consciousness science, then, the book's various methodological contributions would have been more convincing if they were specifically set up to investigate a methodological hypothesis. They still lack the experimental rigor we have come to expect from research in psychology and consciousness science (Seth et al. 2008). Nevertheless, that such rigor is indeed possible and feasible in the science of lived experience is indicated by a growing number of methodological studies of phenomenological reports (e.g., Sandberg et al. 2010; Marti et al. 2010; Overgaard et al. 2006; 2010). These studies are putting the practice of introspection on a more secure footing, although at the moment the subjects' reports are still based on relatively naïve introspection rather than one of the more specialized first- or second-person methods discussed in the book. There is therefore an opportunity for the authors of the book to get involved in this important debate.

Accordingly, despite some reservations it is evident that mainstream science can greatly benefit from the practical knowledge of first- and second-person methods that

has accumulated outside its traditional remit. The depth and range of the anecdotal evidence provided by many of the authors in this volume offers a number of fascinating starting points for more rigorous scientific studies. Indeed, with the establishment of such a mutually beneficial link, this aspect of consciousness science may also be translational into improved methods for self-development and training, as well as for alleviating human suffering in clinical and self-help settings.

Beyond the book: Mutual constraints

The authors of *Ten Years of Viewing from Within* have taken Francisco Varela's call for a phenomenological pragmatics to heart. However, given Varela's explicit insistence on the need for integrating phenomenology and science in a mutually constraining manner, it is striking that none of the authors in a book about his legacy make a sustained attempt to relate their method and findings to those of the empirical sciences (e.g., psychology, neuroscience, physiology). This is especially remarkable considering what Varela and Shear asserted in their editorial to *The View from Within*:

> " The overall results should be to move towards an integrated or global perspective on mind where neither experience nor external mechanisms have the final word. The global perspective requires therefore the explicit establishment of *mutual constraints*, a reciprocal influence and determination (Varela 1996). In brief our stance with regards to first-person methodologies is this: don't leave home without it, but do not forget to bring along third-person [empirical] accounts as well. " (Varela & Shear 1999b: 2)

What has happened to this overall goal of integration and mutual constraint? The lack of any contribution in this direction in *Ten Years of Viewing from Within* may serve as an indication of the paucity of relevant studies. Has the role of third-person accounts been forgotten in the first-person study of consciousness since *The View from Within* was published? Admittedly, the follow-up book's more narrow focus was an explicit editing choice of Claire Petitmengin, who was interested to show that such experiential inquiry could form a scientific discipline in

its own right (Petitmengin 2009b: 17). But, as far as we know, even outside the scope of this book no systematic efforts have yet been made to validate and calibrate these specialized first- and second-person methods according to standard psychological practices (Froese et al. 2011). In fact, even Varela's flagship project of neurophenomenology has only resulted in two noteworthy experimental studies in the 10 years since *The View from Within* was first published (Lutz et al. 2002; Petitmengin et al. 2007), and both of these were beginning to be shaped by Varela himself during his lifetime.

Add to this current dearth in neurophenomenology that leading experiential practitioners are keen to demonstrate the autonomy of their first- and second-person disciplines (e.g., Petitmengin 2009b), and that leading consciousness scientists appear to be happy to conduct their investigation of experience from the third-person perspective alone (e.g., Baars 2005) or draw conclusions from subjects who are not practiced in becoming aware of their experiences (e.g., Dijksterhuis et al. 2006), and it seems that there is still a lot of room for further improvement. In general, Varela's call for the establishment of mutual enlightenment between a dedicated phenomenological pragmatics and the best of behavioral and brain sciences, has largely remained unheeded – at least so far.

We would therefore like to take this opportunity to go beyond the contributions of *Ten Years of Viewing from Within* in order to reiterate the need for an integrated science of consciousness, namely one that consists of three distinct yet mutually informing and constraining elements: phenomenology, empirical sciences and theory (see Figure 1). In addition, as we have remarked above, even though phenomenology was the primary emphasis of *Ten Years of Viewing from Within*, many authors present insights that could be brought into closer relationship with the other two pillars of consciousness science as we see it. We will also highlight some of these opportunities and possible connections in the following sections.

At the moment, the generally accepted framework of consciousness science mainly consists of theory and empirical sciences, with descriptions of lived experience relegated to a marginal role at best. It is there-

fore important to motivate the introduction of phenomenology as a foundational pillar in its own right. The crucial question is: What can be gained from a disciplined phenomenological pragmatics that cannot be attained by more traditional means of introspection? A convincing demonstration of practical phenomenology's unique potential for consciousness science is needed, namely a demonstration that shows (i) that this approach is essential for scientific progress, and (ii) that it cannot already be achieved by using naïve introspection, ad hoc dialogue, or fixed questionnaires. To put it differently, a showcase "killer app" of first- and second-person methods is currently still missing.

In addition, there are several useful ways in which a disciplined phenomenology can better inform the already existing practices in cognitive and consciousness science. We will discuss some of these opportunities, grouped according to their relation to the three pillars shown in Fig. 1, in more detail below.

Phenomenology guiding theory

To begin with, there is the potential influence of phenomenological findings on the theories of the sciences of the mind. For example, Vermersch (2009: 40) suggests that the classical phenomenological "idea of pre-reflective consciousness is in itself revolutionary for cognitive sciences" [2]. This may be true, but it is important to mention that there is a wealth of research into unconscious and implicit processing in the cognitive sciences, and some of this appears to address what phenomenologists would term "pre-reflective consciousness," albeit under different terminology. In addition, few cognitive scientists would doubt that sophisticated practices of introspection, such as mindfulness meditation, can improve conscious control of attention and broaden what may enter reflective conscious experience. This demonstrates that the separation of these two disciplines does not serve either party well. Synergy between the two should constrain and inform theories about

259

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2 | The term pre-reflective is derived from Husserl's phenomenological tradition where it refers to an experience that is lived without being fully aware of itself, or reflectively self-aware, and thus not directly accessible to verbal report.
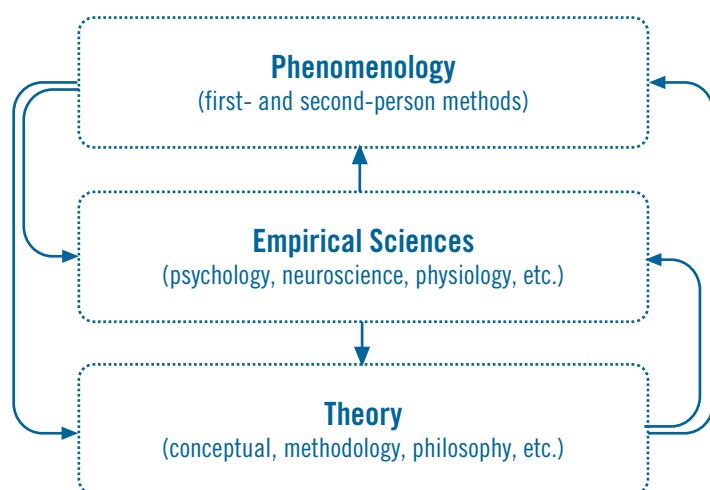
Figure 1: The three pillars of consciousness science.

what may or may not enter (reflective) consciousness and become reportable and how the practice of becoming aware can be improved.

In some cases, it may be common practice in the cognitive sciences to employ a binary distinction between conscious and unconscious processes: some tasks require consciousness, some do not; some stimuli are experienced consciously, some are subliminal. However, there are also theories that utilize a distinct category of not immediately reportable "phenomenal consciousness" (e.g., Block 2007), or the "pre-conscious" (e.g., Lamme 2010). Similar to the phenomenologists, this category thus makes use of a broad definition of consciousness, such as one that includes every aspect of what it is to be like that person (Nagel 1974), and not merely that part that is cognitively accessible.

Moreover, several theories of the necessary conditions for pre-reflective, phenomenal consciousness have been proposed, e.g., recurrent processing (Lamme 2010; Block 2007) and information integration (Tononi 2008). According to these theories, *reflective* consciousness is said to emerge when additional constraints are satisfied. Cognitive neuroscience models with a three-fold distinction between the unconscious (U), the pre-conscious or pre-reflective (PR) and the reflective conscious (C) could therefore be usefully related to the neurophenomenology that Varela advocated. Here a "U"

process is impossible to report under any circumstances. (Examples could be components of rapidly changing visual stimuli, or the neural signaling that regulates certain internal organs.) A "C" process is reflectively conscious and accessible for verbal report, whilst "PR" represents a pre-reflective process that has the potential to become "C" but is currently inaccessible.

According to Lamme, the transition from U to PR occurs when a stimulus is present for long enough for reciprocal neural processing to occur, whilst the PR to C transition only occurs when attention is focused on the stimulus. This framework allows for introspection techniques to play a role in shaping transitions from PR to C by manipulating attention.

Interestingly, the EI method is presented as being applicable to both still present and forgotten past experiences, and it is useful to consider the assumptions of this claim at each level within the ternary model we proposed . Regarding *present* experience (Fig. 2a) the claim is uncontroversial: a guided shift in attention may allow aspects of a PR process to enter C. In recalling past experience, an EI clearly aids memory by placing a past C experience back in the present C. More controversial is the claim that a *past* PR experience can be made into a present C experience. Since most of the examples provided in the book involve experiences that were unreported at the time that they originally occurred, it is unclear whether

they were originally C or PR in the past moment. We illustrate this open question in Figure 2b.

Expanding the consciously reportable aspects of lived experience via methods of introspection will help inform new theories about how the brain performs cognitive tasks, if only by creating novel hypotheses. Conversely, neuroscience has identified certain structures (such as the hippocampus) that appear to be necessary for the formation of new memories, suggesting that unless an experience crosses the relevant hippocampal threshold, there may be little possibility of it being recalled even if the introspective process is skillfully mediated in a second-person manner. Therefore, neuroscience could help guide introspective methods by classifying the PR processes that could possibly be accessible via memory recall. On the other hand, if phenomenological research manages to challenge the conclusions of current neuroscience by demonstrating better than expected recall of experiences, then we need to revise our neuroscientific theories to fit the novel data.

Phenomenology guiding empirical studies

In this section we will explore how phenomenology may be beneficial in the designing and interpretation of neuropsychological experiments. This potential benefit has already been recognized by some research groups in consciousness science (Gallagher & Sørensen 2006), even despite historical prejudice associated with first-person methods (Locke 2009). However, it should not be assumed to be a far reaching attitude yet. In fact, one can still find appeals to careful studies of lived experience dismissed in an *a priori* manner by psychology because of the "total irrelevance of phenomenology" (e.g., Spaulding 2010: 131).

Conversely, when reading Husserl's original motivations for establishing phenomenology as a foundation for all knowledge, and with the current refinement of first- and second-person methods, one can get the sense that phenomenological practice could stand alone, completely separate from neuroscience to create a science of lived experience. However, given the availability of modern neuroscientific tools, and

the undeniable relationship between the neural and the experiential, it is obvious that results from neuroscience are a central part of a multi-disciplinary science of consciousness. Equally, there is an opportunity to develop a deeper understanding of results in neuroscience by routinely applying rigorous introspective methods to cognitive experiments. At the very least, already well-established insights of phenomenology should be taken into consideration in the cognitive sciences (Gallagher & Zahavi 2008), for example through the process of "front-loading" existing phenomenological insights into novel experimental designs (Gallagher 2003; Gallagher & Sørensen 2006).

What could be gained by including phenomenological pragmatics as part of the scientific routine? The standard practice of cognitive science requires that we use "indirect information, such as behavioral physiological and neurophysiological traces," in order to infer "what the subject is conscious of [and] what happened to him" (Vermersch 2009: 21). Vermersch rightly states that "attempting to consider the resulting verbalizations" from experimental de-briefs and questionnaires alone fails to consider the "acts which give rise to them" (ibid: 21). These mental acts are relevant to understanding what has been said by the participant. Indeed, Vermersch rather bluntly points out "You harbour... the illusions that you merely elicit verbalisations... You place yourself in the situation of not knowing how you obtain your data" (ibid: 22). This kind of "heterophenomenology" (Dennett 2003) ignores the possibility that we could come to a mutual agreement with the participant about their mental processes through a specialized interview, and that we have recourse to our own experience to understand the experience of the other person. At the very least we can let the participants construct their own phenomenological categories (e.g., Ramsøy & Overgaard 2004).

What we are starting to appreciate through the promotion of the practice of phenomenology is that there is a wealth of information to be gained via direct communication with the subject. For example, subjective experience during a neuropsychological investigation may be responsible for a large amount of variability in results, which is usually discarded via averaging

Figure 2: Assumptions regarding the accessibility of PR experience in the EI method. (a) Where the PR and C occur together within a narrow timeframe ("present experience"), it may be possible to translate PR to C. (b) Where the EI requires contact with an experience that has happened in the more distant past ("memory of experience"), it may be possible to re-evoke the C content of that experience to the present C experience. But it still remains unclear whether past PR experience can also be made present in C.

techniques, and this variability may be better understood following precise generation of first-person reports via methods such as the EI. Although experimental variability may be overcome with larger data sets, an examination of the first-person experience may aid in the development of experimental designs that more accurately address the specific research question, and at the same time reduce the need for speculation about the cause of such variability.

As we noted before, unfortunately we are yet to be presented with *the* seminal publication that succeeds in combining the best of phenomenology with the best of neuroscience. In the interest of illustrating the full potential of such a methodological cross-over we will perform a critical analysis of the two most outstanding examples of neurophenomenology that have been published since Varela and Shear's (1999a) *The View from Within*, as well as of one study based on experience sampling.

Case study 1: Prodromes of epilepsy. To begin with, let us consider the work by Petitmengin et al. (2007: 750). The guiding question of this research was: "do the neuro-electric preictal modifications identified among epileptic patients correspond to modifications in their subjective experience, and if that is the case, what are they?" The detection of a neurological preictal

state in itself "indicates the *structure* of the cerebral activity, but does not give any indication about the *nature* of the subjective experience that could correspond to it" (Petitmengin et al. 2007: 750).

Briefly, this investigation entailed the second-person evocation of a previous epileptic prodrome (the preictal state, i.e., the experiential state that consciously precedes a seizure in some patients) and examination of the apparently pre-reflective content of the prodrome experience via the EI method. This phenomenological detail was subsequently used to analyze neuronal activity obtained via EEG in the hours preceding the seizure and reportedly enabled the "discovery of a new neuro-dynamic structure" relevant to understanding the neurological basis of epilepsy (Petitmengin & Bitbol 2009: 398), namely a desynchronization of the neuronal populations related to the epileptogenic focus, which could occur up to 5 hours before the seizure onset (Le Van Quyen et al. 2005). Of particular note in this study is the benefit brought to the epileptic patients in becoming aware of their preictal symptoms, which enabled them to improve their quality of life through gaining a certain amount of control over their seizures.

Nevertheless, the investigation unfortunately falls partly short of the dramatic demonstration of the power of the EI meth-

261

od that it may suggest. Upon closer inspection of the publication and surrounding literature, it appears that (i) the phenomenological data did not provide any explicitly new findings in general discussions of the epileptic prodromes that had not previously been elicited in standard clinical assessments, and (ii) preictal neuronal desynchronisation has previously been reported "at a distance of the seizure" (Petitmengin et al. 2007: 756), although not quite as early as reported here: due to recording limitations, previous investigations had only collected EEG at a maximum of four hours before seizure onset (Mormann et al. 2003a; 2003b).

Interestingly, the phenomenological reports appear to suggest that the neuronal signature of a seizure should be evident up to 24 hours in advance for some patients, in accordance with the reported onset of their prodromes. However, neuronal desynchronisation was only identified "up to five hours before seizure onset," at least in some cases (Petitmengin et al. 2007: 756).

This study does demonstrate the complementarity of phenomenological and neuroscientific methods in that prodromes may be accompanied by a preictal neurological state, although we are not provided with a correspondence of the two on an individual patient level. The ideal experimental result would be an identification of the prodrome onset on the experiential level by the EI, accompanied by the retrospective identification of a significant change in neural dynamics at the same point in time. Perhaps the reason such a direct correlation has not yet been produced is due to the limitations in our neuronal recording equipment, analysis or understanding of network dynamics, and not due to a failure of the EI method itself. If this is the case, we can hope and expect that these tools will develop to a high enough degree of specificity in time, such that they match the attainable phenomenological detail.

Case study 2: States of readiness. In a second example of neurophenomenology, participants were trained to report their state of readiness for engagement in a visual task and these phenomenological reports were used to interpret patterns of neural activity obtained via EEG (Lutz et al. 2002). On the basis of the phenomenological reports, the experimenters constructed three distinct categories of readiness and subsequently demonstrated that specific patterns of synchrony in frontal electrode sites were correlated with differential states of readiness on a trial-by-trial basis.

Here we have the use of an experiential category as a criterion for neuro-dynamic analysis that enabled the detection of an original neural signature. Moreover, the experimental data showed that there was a 65% correspondence in the grouping of trials based on the three identified phenomenological categories of readiness and grouping based on reaction times alone. This correspondence gives support to the phenomenological finding that the specific experiential state of readiness is correlated to a certain degree (65%) with the behavioral act of pressing a button in response to a visual experience.

However, in order to convey the additional benefit of acquiring introspective reports from specially trained participants, we would expect to be presented with relevant statistical data regarding the limitations of considering the behavioral outcome in isolation. The presentation of such comparative measures is commonly found in neuropsychological methods papers; it is possible that if phenomenology was introduced (and publicized) to cognitive scientists in such a manner, the uptake of this practice would be enhanced.

Case study 3: Mind-wandering during the resting state. A final topic of investigation that holds great promise is the identification by Hurlburt and colleagues of five typical states of inner experience, namely inner speech, inner seeing, unsymbolized thinking, feelings and sensory awareness (e.g., Heavey & Hurlburt 2008; Hurlburt & Heavey 2002) . An exciting route of investigation would be to apply their DES technique to neural investigations of the default mode network (DMN) and "resting state" fMRI activity. Our current understanding of the cognitive process that can be inferred from resting state data is highly limited, as by definition the participant is resting during data collection and therefore cannot be involved in a behavioral task that would normally guide our interpretation of conscious states.

Christoff and colleagues (2009) have attempted to elicit verbal reports during resting states, but the level of introspection required by the participants was minimal as the design lacked a theoretical and methodological appreciation of principled first- and second-person methods. At random intervals participants in the Christoff et al. study were simply required to "sample their experience" as to (i) whether their mind was "wandering," and (ii) whether they were aware or unaware of their mind wandering.

If one accepts Hurlburt's distinction of five types of inner experience, one would hope to identify specific neural correlates distinct to each of the five specific states. As this investigation did not specifically address Hurlburt's five types of inner experience, the conclusions drawn from this data are limited to discussions of neuronal correlates of mind wandering in general. The authors reported (i) identification of DMN activity during mind wandering, supporting the "theoretical accounts of DMN function" (ibid: 8719), and (ii) enhanced executive network recruitment whilst the participants were not aware that their mind was wandering.

For our purposes, this study, importantly, demonstrates that (i) phenomenological reports of engagement in the task were correlated with task accuracy (participants made significantly more errors where they reported being "off-task"), and (ii) the executive network, previously considered to be only employed in demanding mental activity, is indeed active during mind wandering. To further understand these results, it would be interesting to define whether specific and conscious content-related aspects of the executive network were active and if they matched Hurlburt's categories of conscious phenomena.

Further potential. It is clear that the use of verbal reports has contributed to the three case studies described above. However, it has not yet been established by the advocates of neurophenomenology that a mediated elicitation of pre-reflective experience by trained interviewers has led to experimental insights that could not also have been gained from traditional behavioral or neuroscientific methods. Similarly, in the experience sampling case study, the insights gained did not necessarily require precise reporting.

Christoff and colleagues do cite Hurlburt's work as informing their particular method of experience sampling, but they do not use Hurlburt's method to the full extent of its capability. How much more insight could have been gained if subjects had been given full expositional interviews as well?

In the future we hope to see a clearer demonstration of the potential of first- and second-person methods in the context of consciousness science. As we have noted already, several papers in Petitmengin's (2009) edited collection could serve as suitable starting points for such a mutually informing project. In particular, it is worth highlighting the purported identification of generic experiential structures, such as the three modes of listening (Petitmengin, et al. 2009) and the distinct dispositions of attention (Andreas & Andreas 2009). These identified structures are open to intersubjective verification by other research groups, and they could also form the basis of novel psychological and neuroscientific experiments. In fact, the whole book can be seen as an open invitation to anyone interested in "front-loading phenomenology" (Gallagher 2003) onto their next experimental design.

More generally, if interview techniques such as the EI and DES are accepted by the wider scientific community as a valid tool for obtaining phenomenological data, these techniques may be applied to an almost unlimited range of research topics where human experiences are employed or studied. They may be particularly useful when used in conjunction with technological methods of varying lived experience (e.g., Slater et al. 2010; Froese & Spiers 2007). Furthermore, the specific benefits of EI in achieving detailed description may aid in our understanding of the precise processes involved in psychiatric disorders such as post-traumatic stress disorder, depersonalization, derealization and other disorders. For example, a more detailed phenomenological assessment of schizophrenia has already begun (Parnas et al. 2005). This kind of phenomenological understanding may also aid in the treatment of these disorders using non-pharmacological interventions by increasing awareness in the patient, for instance in a similar manner to the quality of life improvements reported in the epilepsy patients (Petitmengin et al. 2007).

BOX 3: When is the content of a verbal report valid?

"[W]e are witnessing the emergence of a new conception of the validity of a description, which cannot be measured in static terms of correspondence to experience, but in dynamic terms of authenticity of the process of becoming aware and describing. Whether they are objective or subjective, the criteria of validity we have do not inform us about the adequacy of the description content, but about the subject's level of contact with experience. The validity of a description is not evaluated by comparing it with its hypothetical "object," but according to the authenticity of the process that generated it." (Petitmengin & Bitbol 2009).

Phenomenology guiding phenomenology

We have looked at two essential roles for first- and second-person methods in consciousness science, namely their relevance to theories and to empirical studies. In this section we will briefly comment on one of the focal topics of the methodological contributions in *Ten Years of Viewing from Within*, namely a reflexive application of the phenomenological methodology to itself. In particular, we will comment on the systematic study of this reflexive process by Petitmengin and Bitbol (2009) in the context of the EI method.

The explicitation process, in the sense of becoming aware of one's pre-reflectively lived experience and describing it, typically begins with a gesture of loosening up in order to induce in oneself an attitude of receptiveness. This is followed by an iterated sequence of precise gestures that is summarized by Petitmengin and Bitbol (2009: 387) as "entering into contact with experience, testing the quality of this contact, intensifying this contact, letting words come, confronting words with experience to evaluate their appropriacy." We will have more to say about the crucial notion of "entering into contact with experience" below, but for now it is important to clear up a potential confusion about the process of *evaluating* a description of experience.

The problem is that at first sight "confronting words with experience to evaluate their appropriacy" appears to be in direct tension with the authors' subsequent claim that "the validity of a description cannot be assessed according to its ability to reproduce the described *content*, but according to the quality of its own production process" (ibid: 389). In other words, Petitmengin and Bit-

bol claim that when we recursively investigate the explicitation process, we realize that the idea of validity as measuring the direct correspondence between the experience and its description is untenable, and that it should be replaced by a dynamic criterion that evaluates the authenticity of the generative mechanism underlying the verbal report (see **Box 3**).

This practice-based epistemological move is in line with the constructivist approach in the philosophy of science, which also holds that the validity of experimental data cannot be assessed on the basis of their correspondence with the "real" properties of the world. Similarly, introspective reports cannot be assessed on the basis of their correspondence with "pure" experience, but only on the basis of the authenticity and coherence of the acts that gave rise to them. In both cases the manner of assessing the validity of data always stays within the domain of experiencing, since we can never step outside of our lived situation (Bitbol 2002). That the validity of verbal reports needs to be assessed in relation to their coherence is also beginning to be accepted in consciousness science (e.g., Marti et al. 2010; Block 2007: 485).

But how does this dynamical conception of validity square with the need for "confronting words with experience to evaluate their appropriacy" during the explicitation process? Is that not precisely asking for a measure of the correspondence between the experience and its description? The resolution of this apparent tension lies in the fact that there are actually three different perspectives that are typically involved in making use of an explicitation process in consciousness science, and that it is essential not to get these mixed up. In fact,

263

Petitmengin and Bitbol were talking about the *first-person perspective* of the interviewee when they included the gesture of "confronting words with experience" as a part of the explicitation process, and in this context the supposed correspondence should be understood in terms of the appropriateness of an expression for the participant undergoing the lived experience in question. In the *second-person context*, however, this criterion is meaningless since the interviewer is not undergoing the lived experience of the interviewee, and must therefore evaluate the validity of their expressions in terms of the presence of markers indicating the level of awareness of the interviewee.

Note that this assessment of the authenticity of the subject's current evocation state is not the same as an assessment of whether the generated verbal descriptions cohere with an existing body of knowledge about the phenomenon. Vermersch's essay (2009) is helpful in this regard for strongly emphasizing the difference between assessing the validity of verbal reporting during the second-person interaction, and assessing descriptions during a post-interview *third-person analysis*. While the second-person notion of validity of a verbal description is based on an assessment of the authenticity of the interviewee's level of awareness (see also Hendricks 2009), the third-person notion of validity is measured in terms of the coherence of the content of a report with the investigator's current scientific understanding of the phenomenon.

As in all science more generally, it is a question of having to evaluate (i) whether the right "instrument" is used to gather the (first-person) data, and (ii) whether this data "fits" with what is already known about the phenomenon, or if it perhaps should be discarded as noise. In other words, the validity of phenomenological reports depends on (i) the authenticity of the generative process, and (ii) the coherence of the generated data. To ask more of the phenomenological methods, e.g., that they should be able to verify the correspondence between a description and lived experience, is to succumb to a naïve view of the scientific method. Scientists are never in a position to directly determine whether their measurements correspond to reality, as constructivists are fond of pointing out; all they can do is make sure that

their instruments are working properly and that the measurements fit coherently within a context of other measurements. From this perspective the second-order application of phenomenological methods to themselves makes sense: they provide us with more measurements that we need to take into account, while at the same time informing us about the authenticity of the generative process. Of course, another challenge is to use these insights in order to generate novel hypotheses that make testable predictions.

Becoming aware as a method: Problems, analogies and proposals

One of the most important debates within phenomenology is the extent to which becoming reflectively aware of pre-reflective experience transforms that experience. Does becoming aware change one's experience? Is phenomenological method tarnished by a falsification of its target? We will examine this issue from a number of perspectives.

Explicitation: Retrospection or fabrication?

One aspect of this debate focuses on the possibility of explicating a past experience. Hurlburt (2009) presents the argument that it may not be possible to capture pure pristine experience through introspective methods, rather we should aim to record a "faithful apprehension" (ibid: 158) of the participants' experience. Hurlburt's argument for this faithful apprehension being scientifically acceptable is reminiscent of findings in standard memory research that "memory is not a verbatim reproduction but rather an imperfect representation" (Anastasi et al. 2000: 2).

There are likely substantial opportunities available to phenomenologists in integrating with such cognitive research, and relevant empirical findings would undoubtedly serve to inform their debates. For example, when arguing that expertly guided retrospective access to experience does not suffer from distortion (Petitmengin & Bitbol 2009), this claim could be supported by cognitive investigations of false memory. In these studies we see that even though false memories can be formed surreptitiously or experimentally,

they appear to affect only a small proportion of experimental populations.

For instance, in a study by Loftus and Pickrell (1995) it was found that 75% of participants resisted an experimentally induced false suggestion. In the same study, the language used by participants who did accept the false memory was such that a skilled interviewer would have recognized the danger of infidelity. So by reference to investigations of false memory, it appears that not only is the probability of false memory in a participant low, even in the case of a deliberately misleading experimenter, but also that such false memories would be recognized by these second-person methods and excluded from analysis.

Training: Clarification or transformation?

Another aspect of this debate relates to the role of training. Hurlburt's DES method, for instance, encourages training the participant in the techniques of faithful apprehension through iterative exposure. But there is nevertheless a danger that repeated introspection may increase the probability of transformation of the original experience in a cumulative manner, a possibility that Hurlburt (2009) is aware of. For example, whilst investigating sensory awareness, Hurlburt reports that during the first session his participant reported no instances of sensory awareness, however in his second interview session "all of the [participants] five samples... contained sensory awareness" (Hurlburt et al. 2009: 237).

A skeptical reader might question whether discussion of sensory awareness during the first interview session actively *caused* the participant to perform these sensory acts with increased frequency and thus the experience of sensory awareness appeared more commonly in his introspective report. This would be in direct conflict with Hurlburt's aim, where repeat exposure is sought to attenuate the potential confounds that may lead to distorting biases. In other words, the more participants are trained in such methods, the further they may become removed from what we would consider to have been their "normal state of mind." Is such skepticism warranted?

Hurlburt (2009) and his colleagues evidently think that it is beneficial for a skilled

264

interviewer to apply an iterative approach. But the methodological question is this: How do they know whether this is actually the case? What convinces them that their particular approach to training the subject in becoming aware of their experience does not systematically reduce access to pristine experience? In addition, how do we know that the sound of the beep that signals the moment to report does not seriously distort the participant's experience?

In order to properly answer these questions it is necessary to take a closer look at the crucial moments when the methodology interacts with the participant. We need to know more about the moment *after* the beep, when the participant is still in the process of recalling and recording the experience that happened just before the beep, as well as in the interview process itself so as to determine the way in which these interventions affect the unfolding of experience.

In fact, we suggest that, following the example of Vermersch (2009) and Petitmengin and Bitbol (2009), we could begin to investigate the effects of the DES method by applying it to itself. For instance, a simple extension to DES would be to see what happens when a beep occurs whilst the participant is still writing notes about the previous beep and is thus forced to become aware of and describe their experience of becoming aware and describing. In other words, rather than treating these "second-order" beeps as unusable samples (as is currently done, see Heavey & Hurlburt 2008: 801), they should become part of a systematic methodological study.

Transformation: Beneficial or detrimental?

Interestingly, even if it turns out that explicitation and/or training does transform the experience of the participants, it is not immediately clear whether this transformation is detrimental to the scientific goals of first- and second-person methods. In fact, it is also possible that some types of transformation may actually be methodologically desirable.

For example, many essays in *Ten Years of Viewing from Within* affirm that becoming more aware of lived experience can indeed have beneficial effects in terms of quality of

life, personal development, and psychotherapy (e.g., Hendricks 2009). But these personal benefits aside, what are the scientific consequences of this transformation? Is an enriched experience not a different kind of experience than a "normal" experience? This appears to be the case; otherwise it would be hard to explain why the former is so desirable. Moreover, this difference is not merely a matter of degree. It appears that the very structure of the experience can also be modified because of the first- and second-person training:

❝A difference of experiential structure may also be due to a difference of expertise. […] Different descriptions, different structures, only show in this case different degrees of skill, different degrees of reflective consciousness.❞ (Petitmengin & Bitbol 2009: 396)

Petitmengin and Bitbol (2009: 388) admit that their investigation of the process of explicitation has revealed that "explicit-ing indeed transforms experience" and that while it does not dissect it, "it has the effect of unfolding experience, while enriching it with new nuances." Referring to their study of auditory experience (Petitmengin et al. 2009), the authors comment that "the development of an appropriate vocabulary allowed us to progressively refine our consciousness of this experience" (Petitmengin & Bitbol 2009: 389), by which they mean that the generated words can act as a "handle" that can be used to discriminate and intensify differences in experience, as well as to generally intensify one's contact with the level of experience itself.

It is evident that Petitmengin and Bitbol consider the transformation of the experience during the explicitation interview to be an advantage rather than something detrimental that is to be avoided. But why should we not consider the induced change to be a form of interference instead? After all, if we wanted to study "normal" experience and thus proceeded to interview someone to become better aware of the structure of that type of experience, then by doing so we would appear to have missed the target since the structure of their experience would have now been transformed to accord with the increase in expertise and would no longer be "normal."

In practice, however, these worries appear to be less warranted than they might appear from a purely theoretical perspective. First of all, practitioners of experiential methods appear to be aware of the fact that their experience has changed, which gives the possibility of investigating how they are aware of this difference and what precisely it consists of. In other words, even though training changes experience, it may still be better from this new vantage point to study what came before, and it may be possible to determine why that is.

Second, just how detrimental the transformations of experience are for a science of consciousness also depends on our concept of "experience." Does it describe the total lived state of the whole person, or just a particular event within that holistic presence? If we assume that the term "experience" refers to the whole person's lived situation then it follows logically that becoming aware of an event transforms that "experience," since awareness is a part of this whole. But it may also turn out that an experience is better conceived of as a momentary and individuated event within a whole field of lived presence. Moreover, if it turns out that awareness is an independent parameter of this field, then it should be possible to skillfully vary our awareness without significantly perturbing the experiential event that is observed (just as a telescope can magnify an object without disturbing that object).

In any case, at the moment it still remains an open question as to whether it is possible for an observer to undergo a transformation regarding their *awareness of* an experience without the *experience itself* undergoing its own kind of transformation in response. In order to address this issue satisfactorily, future research in the science of consciousness should try to clarify precisely what constitutes an experience as such and what its relationship is to reflective awareness. This is a good opportunity to apply an integrative approach that makes use of all the three pillars of consciousness science since we have a theoretical challenge that can be addressed by the phenomenological investigations of Petitmengin, Bitbol and others, as well as related studies in behavioral psychology (e.g., Kouider et al. 2010) and neuroscience (e.g., Overgaard et al. 2006b).

265

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266

Interference: Analogy with quantum mechanics

Finally, even if it turns out that the transformation of experience induced by the practice of first- and second-person methods does involve a certain amount of undesirable interference, this does not need to spell the end of these methods as far as a science of consciousness is concerned. To illustrate why this is the case we can consider an analogous situation in modern physics.

Quantum mechanics is concerned with matter at the most microscopic level. At this scale, measurement affects the state of the system being observed, as the observations are necessarily derived from physical perturbation of a system. For example, when observing a physical object through a microscope, it is necessary for there to be some shining and reflection of light on the target object. If the object is large enough then this process has no significant effect. However, if the object is of quantum size, say a single particle, then even a single photon has the potential to have a significant interference effect on the system under observation.

By analogy, reporting about the mind involves perturbation of the mind by either itself (first-person) or another mind (second-person). In an attempt to observe and analyze the most microscopic constituents of the mind, this perturbation is likely to have a significant effect on what is being observed. Indeed, Petitmengin and Bitbol discuss this "observational distortion" (2009: 365-367). As noted previously, the changes induced by observation of the mind can be dramatic, but the question then arises as to whether we can characterize this process of interference in a scientific way.

The success of quantum mechanics demonstrates that neither observational distortion nor limits to epistemic certainty necessarily prevent the construction of a precise science. Similarly, the potential for observational distortion should not limit the application of phenomenology, particularly if we treat the nature of this interference as one more phenomenon that needs to be explained by a successful theory of consciousness (e.g., Marti et al. 2010).

Conclusions

In recent years there have been many advances in consciousness science. New discoveries are being made all the time, the measurement technology is becoming more refined, and dedicated journals are being created. After suffering from decades of scientific taboo and popular neglect, there is rightly a general sense of optimism pervading this pioneering field of research. And the stakes could not be much higher: like no other scientific discipline before it, the verdicts of this field cannot be separated from how we understand ourselves; it concerns what is most intimate to our very existence.

At the same time we are confronted with a strange methodological circle since conscious experience is necessary for measurement and, in terms of intersubjective verifiability, foundational for the scientific method as such. Consciousness science is therefore not one more specialized field among others; what science has to say about the constitution of experience will have implications for the foundations of the scientific process itself, thereby potentially inaugurating a "second-order" science.

The existence of these personal and methodological circularities presents the possibility of a potentially mutually informing link between consciousness science and constructivist traditions, especially since the former offers strong empirical approaches that constructivism often lacks, and the latter offer solid theoretical approaches to the problem of self-reference that consciousness science often lacks. In addition, the introduction of practical phenomenology can help to clarify the experiences from which both traditions draw their insights. And there is a chance that consciousness science as a whole will manage to do what constructivism (or phenomenology), by itself, has never achieved, namely to gain acceptance and recognition by the scientific mainstream.

We have identified many challenges that still need to be overcome to integrate further the first- and second-person research programs with the rest of consciousness science, but we see the possibility for exciting developments in the coming years. We have highlighted several areas where important

BOX4: Brecht's The Life of Galileo (edited excerpt)

Galileo has exchanged the Republic of Venice for the Florentine Court. The scene is Galileo's house in Florence, where Galileo is receiving the great royals and intellectuals of his time in order to share his discovery that Copernicus' heretical theory of a heliocentric solar system is borne out by observations using a telescope.

GALILEO [at the telescope]: As your Highness doubtless knows, for some time past we astronomers have been in great difficulties with our calculations. For these we use a very old system, which appears to coincide with philosophy, but not, alas, with facts. According to this old system – Ptolemaic – the movements of the stars are presumed to be extremely complicated. [...] But even accepting such complicated movements, we are still not able to calculate the positions of the stars correctly. [...] And furthermore there are certain movements of the stars for which the Ptolemaic system has no explanation at all. Movements of this sort seem to me to be described by the little stars round the planet Jupiter, which I have recently discovered. Would the gentlemen care to begin with an observation of the satellites of Jupiter, the Medicean stars?

ANDREA, his pupil: [pointing to the stool in front of the telescope] Please sit here.

THE PHILOSOPHER: Thank you, my child. I fear that things are not quite as simple as all that. Signor Galilei, before we apply ourselves to your famous instrument we would like to have the pleasure of a disputation. The theme: Can such planets exist?

THE MATHEMATICIAN: A formal disputation.

GALILEO: I thought you could simply look through the telescope and convince yourselves.

ANDREA: Here, please.

THE MATHEMATICIAN: Of course, of course. – Naturally, you know that according to the ancients, stars revolving about a centre, other than the earth, cannot exist, nor can there be stars which have no support in the Heavens?

After an extended debate about the possibilities and impossibilities of Galileo's claims given the contrary claims of Aristotle, the Church, and standard school textbooks, everyone leaves the room in order to rest before attending the Grand Duke's Court Ball.

GALILEO [running after them]: But really, you gentlemen need only look through the instrument!

advances seem to be within the reach of current methods. Notably, whilst simple verbal reports and questionnaires are occasionally used in the neuroscience and psychology of consciousness, there is as yet no demonstration of a novel contribution from one of the more specialized introspective techniques that could not have been achieved by these more traditional means as well. Some case studies have led the way, but more remains to be done. We expect this kind of specialized interdisciplinary collaboration to grow in the future, along with a wider re-appraisal of the scientific value of first- and second-person methods.

On a final note, we should accept that as academics we consistently make use of our lived experience in designing and interpreting experiments. A maturing science of consciousness, in the style of Varela's neurophenomenology, will further break down the dichotomy between the observer and the observed, and require personal involvement like no other science (see **Box 4**). We have discovered a new tool within ourselves, so now let us start to make use of it!

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