Morten Overgaard, Shaun Gallagher
and Thomas Zoëga Ramsøy

An Integration of First-Person Methodologies in Cognitive Science

Abstract: *A number of recent publications have argued that a scientific approach to consciousness needs a rigorous approach to first-person data collection. As mainstream experimental psychology has long abandoned such introspective or phenomenological method, there is at present no generally agreed upon method for first-person data collection in experimental consciousness studies. There are, however, a number of recent articles that all claim to provide a unique contribution to such a methodology. This article reviews these suggestions and extracts their core features. It is argued that the suggested methods are generally overlapping and compatible, and a number of concrete methods that easily are applied to experimental studies are put forward.*

In recent years, it has been an emerging view that in order to make progress in experimental studies of consciousness, it is necessary to develop more elaborate 'first-person methods' than those that have been common in cognitive science over the last fifty years. During this long period, there has been immense resistance among psychologists and neuroscientists to the use of first-person methods This is largely due to the fact that it was standard to think of first-person reports as intersubjectively inaccessible and thus not intersubjectively verifiable. In the context of this article, we take first-person methods to

Correspondence:
Morten Overgaard, Hammel Neurorehabilitation and Research Center, Aarhus University Hospital, Voldbyvej 15, 8450 Hammel, Denmark.
Email: neumov@sc.aaa.dk

Journal of Consciousness Studies, **15**, No. 5, 2008, pp. 100–120

mean methods that make use of first-person reports as a central methodological tool.

It has recently been argued that psychology has abandoned first-person methods only rhetorically and that experimental results in psychology and the cognitive neurosciences have in fact always been dependent on the validity of first-person methods (Jack & Roepstorff, 2004). Even though many philosophers and scientists agree on this, and thus also agree that a more explicit use of 'first-person methods' is necessary in the study of consciousness, views on how exactly to go about the study of first-person states are highly diverse. This review limits itself to a discussion of first person methods in the framework of consciousness studies in cognitive science and cognitive neuroscience.

Although it is generally claimed that consciousness was abandoned in mainstream experimental psychology, several authors explicitly made use of first-person reports during the heyday of behaviourism. Researchers such as Antrobus and Singer (Antrobus *et al*., 1966; Pope & Singer, 1976), for instance, performed studies of so-called Task Unrelated Images and Thoughts (TUIT) in the '60s and '70s. One of the main findings from this period was that even during cognitive tasks, spontaneous thoughts turned out to be rather repetitive and predictable, always returning to 'current concerns'. In some studies, subjects were asked to report thought content at random intervals during controlled laboratory conditions and daily activities. It was found that there is a continuous shifting of attention between externally and internally generated sources of information and that thought content becomes increasingly unrelated to external events as these external events become more static and predictable. In other words, the more a cognitive or perceptual task could be performed in an automatic manner, the more task-unrelated thoughts would occur. More recently, Jonathan Smallwood has made use of the TUIT approach in order to study trial-by-trial performance in cognitive tasks (Smallwood *et al*., 2003; 2004).

Other more recent approaches include the application of protocol analysis to study thought and cognition (Crutcher, 1994; Ericsson & Simon, 1996), a rigorous methodology for eliciting verbal reports of thought sequences. Based on a theoretical analysis, Ericsson and Simon (1996) have argued that the closest connection between thinking and verbal reports is found when subjects report about thoughts that occur during a task completion. As subjects are asked to think aloud, some of their verbalizations seem to correspond to merely vocalizing 'inner speech', which would otherwise have remained

inaudible. Non-verbal thoughts can also be often given as verbal expression by brief labels and referents. An example is provided by Ericsson (2002), in which a subject was asked to think aloud while mentally multiplying 36*24 on two test occasions one week apart. The following is an example of the data obtained:

> OK, 36 times 24, um, 4 times 6 is 24, 4, carry the 2, 4 times 3 is 12, 14, 144, 0, 2 times 6 is 12, 2, carry the 1, 2 times 3 is 6, 7, 720, 720, 144 plus 720, so it would be 4, 6, 864.

Similarly, Hurlburt's 'beeper' method (Hurlburt and Heavey, 2004; Hurlburt and Akhter, 2006) has recently provided yet another viable method to consciousness research. Building on early attempts from the beginning of the 20th century (Goodenough, 1928), Hurlburt and colleagues have argued that random probes (usually in the form of a beeper signalling the time for report) of awareness may be a useful approach to obtain accurate first-person reports. The beeper method is thought to provide three measures: time sampling, minimal reactive disturbance, and phenomenological fidelity. First, using a randomly timed probe has the advantage of providing information about thoughts at given time points, and in natural environments. Second, the method can capture fleeting and evanescent thoughts by sampling at times unrelated to subjects' internal or external states, and act as a cue to immediately focus on present or just past thoughts. Furthermore, the beeper method has been suggested to reduce the reliance of meta-cognition and thus avoid over-introspection. As Hurlburt and Heavey (2004) write:

> [Participants] are asked to record the characteristics of the awareness that was ongoing at the moment of the beep, typically by writing notes on a pad. Participants are then interviewed with the goal of developing high-fidelity accounts of their ongoing awareness. This sampling-then-interviewing process is repeated over a series of days until some sense of the nature of the individual's unique inner experience is obtained.

Based on this method, Hurlburt and Heavey have developed a codebook of the forms of experiences that occurred frequently across trials. Indeed, Hurlburt, Koch, and Heavey (2002) showed that there is a connection between inner experience and external behavior, and Hurlburt (1990; 1993) reported on the salient characteristics of individuals with noteworthy commonalities (e.g., schizophrenic, depressed, etc.)[1].

[1] In a related and similar approach, the Experience Sampling Method, as practiced by Csikszentmihalyi and his colleagues (e.g., Larson & Csikszentmihalyi, 1983) provided the largest-scale set of ecologically valid explorations of inner experience.

As should be clear from the above, a wide variety of methods are used in the study of conscious experiences. Some may be considered more *ad hoc* methodology, where other are more formalised as guidelines of how to conduct experiments. Below, we review philosophical attempts to categorise and make sense of different kinds of reports, and we discuss some of the more elaborate guidelines for experiments.

Some philosophers suggest that we should draw a clear distinction between first and third person reports — sometimes just referred to as first and third person data (Chalmers, 2004). This distinction is drawn in such a way that it corresponds exactly to the epistemological distinction typically made in philosophy of mind. The epistemological distinction between a first and third person perspective is based on the idea that we have different kinds of access to information. From a first-person perspective, objects appear in a certain way, with a certain experienced quality, to a given subject. Such observations are relative to the subject and may be influenced by personal history, so that one person cannot share another person's subjective point of view, and cannot from the outside 'measure' what this other person is experiencing. The third person perspective is generally taken to mean an 'objective' perspective where information can be shared by individuals, or where any individual can make in principle identical observations (e.g., using mathematical measurements, counting, using an apparatus for scientific measurements, etc.).

The idea of this distinction is, it seems, that we should think of first and third person data as being fundamentally different 'as data'. David Chalmers says this very clearly: 'The task of a science of consciousness, as I see it, is to systematically integrate two key classes of data […]: *third-person data*, or data about behaviour and brain processes, and *first-person data,* or data about subjective experiences' (Chalmers, 2004, p. 1111). Chalmers and others (e.g. Goldman, 2000) argue that both kinds of data should be carefully considered and used, and that a scientific approach to consciousness has to employ a first-person methodology, i.e., make use of first-person reports (referring to subjectively experienced phenomena).

Others, including more experimentally inclined researchers such as Jack & Roepstorff (2004) or Ericsson & Simon (1984), argue that first-person reports are no different from other kinds of reports. The idea, they say, that data about experiences belong to a different 'class' of data than any other sort of data is simply unwarranted, and, thus, scientists can to a large degree make use of methods more typical to cognitive science experiments, e.g. d′-analysis, to study subjective

states. This conception could be seen as a 'third person interpretation' of first-person reports. However, since this view clearly and explicitly makes use of first-person reports, it can also be considered a serious suggestion for a 'first-person method'.

In the study of consciousness, it has become more acceptable to speak of first-person methods in both of the above conceptions, and several proposals for exact methodology have emerged within different theoretical frameworks. As these proposals today stand in opposition, it will be helpful to review them in regard to the specific issue of the methodologies they offer for use in scientific experiments. In effect, although there is a certain ambiguity here about what constitutes a first-person method, in this paper our aim is not to offer an *a priori* definition or set of definitive criteria for the first-person method. Rather, we seek to discover some common methodological requirements for a first-person science by comparing existing first-person methods. We agree that scientific methodologies need to develop and employ rigorous first-person reports in order to address human consciousness.

Neurophenomenology

Neurophenomenology, as proposed by Varela (1996), is inspired to equal degrees by modern cognitive science and by classical transcendental phenomenology in the tradition of Husserl. Neurophenomenology follows Husserl in the understanding of phenomenology as a methodologically guided reflective examination of experience. Specifically, Varela and his colleagues argue that both the experimenter and subject should undergo some level of training in phenomenological method, including learning to practice the phenomenological reduction — which starts with the 'bracketing' of beliefs or theories one might have about experiences.[2] The training is not about the texts or formulations of phenomenology, but rather an explicit training in its practice, that is, in attending to the appearance of objects and delivering consistent and clear reports of how these objects appear in experiences, and about the experiences themselves. Varela suggests that such a method should be based on three necessary steps, and their consistent practice:

[2] Varela and his colleagues have also suggested the use of techniques from the Buddhist contemplative tradition, e.g., the practice of mindfulness-awareness (*shamatha-vipashyana*) (Varela *et al*., 1991; Depraz *et al*., 2003). A consideration of such contemplative techniques is beyond the scope of this paper, but we do not wish to exclude them from a more comprehensive account of important methodologies.

1. Bracketing & reduction

The core phenomenological method is the suspending of beliefs or theories about the things that we experience, or, as Varela puts it: '[…] a sudden, transient suspension of belief about what is being examined, a putting in abeyance of our habitual discourse about something, a bracketing of the pre-set structuring that constitutes the ubiquitous background of everyday life' (1996). In effect, phenomenology does not appeal to scientific or metaphysical explanations of the world, or our experience of it, nor is it looking for an analysis cast in terms of common sense or folk psychology. By clearing away our ordinary opinions, our everyday attitudes about things, and even our scientific theories about how things work, the aim is to get at the world as it is experienced, and in particular to describe how things appear in that experience.

2. Intimacy & intuition

For the study of consciousness itself, it is vital for the neurophenomenological task that subjects gain intimacy with their experiences. In normal, straightforward activity, subjects do not usually pay attention to the way that objects appear in focus or on the periphery of their perceptual field, for example. There is not normally an explicit awareness of how events are immediately anticipated, or of how they linger in our awareness. As a part of the phenomenological method of reduction, some set of these aspects of the field of one's experience becomes more vividly present. The training aims to accomplish this intimacy without interfering with the normal aspects of experience, which are present in experience but not usually attended to. As Varela points out, the intuitive insight into experience is the 'basis of the criteria of truth in phenomenological analysis, the nature of its evidence' (1996, p. 337). The evidence is given to us in intuition, that is, by means of straightforward seeing of what is present in experience. Intuition may be helped by a method of imaginative variation, in which the subject imagines one or more types of changes in the objects or events of experience. Imaginative variation is designed to discover the invariables that constitute the core meaning of the experienced objects, as well as the essential details of the experience as such. These are not thought experiments in the usual philosophical sense, but a systematic use of the imagination that helps to fix the precise nature of what the subject is actually experiencing.

3. Descriptives

On the basis of this methodical reflection, one then constructs a description of one's ongoing experience. This phenomenological description is not developed in a private language of the mind, but in terms that make the experience available to others, who may themselves have undergone a similar experience. Intersubjective communication of these descriptions can lead to clarifications that are intersubjectively validated.

After training the subject in these procedures, the experimenter may query the subject about his or her experience. Instead of asking 'Do you think this experience is like X or Y or Z?' and thereby supplying pre-defined categories that would constrain the subject's responses, the phenomenologically trained experimenter will ask 'How would you describe your experience?' Such an open question allows subjects to produce more complex responses and to describe the experience in its own terms.

The change from predefined categories to open questions, however, poses a difficulty for the experimenter when the reports are to be considered in correlation with other data, such as those generated by functional neuroimaging. One solution is to gather those reports that are very similar in content and categorise them in a way that would allow correlation with other data. Such *phenomenological clustering* (Lutz et al. 2002) should deviate as little as possible from the original reports, but, to our knowledge, no exact guidelines exist for how to create such clusters.[3] This is, in neurophenomenology, how 'open

[3] It may be thought that Varela's proposal is too demanding to be a realistic suggestion for an improvement in cognitive science in the near future. Neurophenomenology would demand a paradigm change in cognitive science in order to have any noticeable effect, and this might be considered unlikely (Braddock 2001). Braddock finds inspiration in the works of Merleau-Ponty to apply phenomenology indirectly, that is, in a way that is external to the experiment, but as guiding the interpretation of experimental results. Merleau-Ponty (1962) considered synaesthesia to rethink what normal perception is like. By taking a phenomenological approach in asking 'what is it precisely that I see,' rather than relying on what one expects to see on the basis of scientific theory, the 'first-person aspects' are used to guide the interpretation of the empirical investigation. Braddock asserts that such an indirect use of phenomenology is a viable and more pragmatic alternative to Varela's neurophenomenology. The main drawback involved in Braddock's approach in this context is that it does not introduce actual methodological changes in the experimental set-up. Rather, it is a tool for theoretical interpretation, which actually places the proposal outside the framework of experimental methodology. Of course, Braddock's approach is a methodology in its own right, but since indirect phenomenology is an after-the-fact reinterpretation of empirical findings, it does not provide practical guidelines for studying and reporting experiences in the experimental setting, and as such it provides no mechanism for adjusting experimental method.

reports' become compatible with the notion that reports should be 'intersubjectively validated'.

Several experiments have been conducted using these techniques, and one especially has been considered to be a good representative of the methods of neurophenomenology. In Lutz *et al*. (2002), correlations were made between phenomenological reports, reaction times, and measurements of brain activity. Prior to the experiment, subjects developed their own refined verbal reports of their own experiences using a series of preliminary trials. Here, subjects were asked to focus on their own experiences and to report specifically on the presence or absence or degree of distractions, inattentive moments, and cognitive strategies they used. The self-developed descriptive categories were used to divide the trials into phenomenologically based clusters, which represent intersubjective invariables. Subjects reported in their own terms on whether they were *ready* or *unprepared*, or whether they were *surprised* or *interrupted* by the stimulus in the middle of an unrelated thought. All these intersubjectively determined categories were used for reporting during the main experimental trials in which the experimenters also recorded EEG and reaction times from the subject. In the experimental trials, subjects were instructed to press a button when a visual shape had fully emerged on a computer screen. After the button push, the subjects gave a brief verbal description of their experience in terms of their readiness or attention level, etc. The correlations of all parts of the recorded data revealed relations between attention level, reaction times, and dynamic measurements of synchrony patterns among oscillating neural groups.

The experiment can be seen as employing neurophenomenology because subjects were trained in phenomenological method prior to the experiment. Subjects were asked to suspend their beliefs and theories about their experiences, they gained intimacy with their perceptual experiences, specifically in terms of their attention levels and cognitive strategies, and they formulated descriptions that were shared and compared with the descriptions of others.[4]

[4] The results from the study by Lutz *et al*. relate to studies of so-called Task Unrelated Images and Thoughts (TUIT) as described previously (Antrobus *et al*., 1966; Pope & Singer, 1976). In this sense, there are convergent findings from neurophenomenology and experimental psychology. The study by Lutz *et al*. adds significantly to these phenomenological data by providing insights into the neural mechanisms responsible for the different cognitive stages in TUITS.

Front-Loaded Phenomenology

Gallagher (2003; Gallagher & Sørensen, 2006) suggests incorporating the ideas and insights of phenomenological analysis in the actual design of the experiment. He calls this approach 'front-loaded phenomenology.' Insights developed in previous phenomenological work are used to influence the way that the experiment is set up. A 'phenomenologically enlightened experimental science' (Gallagher, 2003, p. 89) means that the first-person experiences of experimental subjects are taken seriously and addressed by experiments that are designed to take them into consideration.

This approach differs significantly from neurophenomenology in Varela's sense although it is not inconsistent with it. It does not demand that experimental subjects learn Husserlian techniques of phenomenological reduction, or even explicitly make first-person reports in experiments. A good example of Gallagher's method can be found in a number of recent neuroimaging experiments that employ the phenomenological distinction between sense of agency and sense of ownership for action. Gallagher (2000) had explicated this distinction in a phenomenological analysis of the first-order or phenomenal level of the experience of involuntary movement where one is able to distinguish two aspects that in the normal experience of intentional action seem to be indistinguishable. If someone moves my body I sense that it is my body that is moving — it is *my* movement and I experience ownership for the movement — but I do not experience agency for the movement (I have no sense that I intended or caused the movement). A number of experimenters have designed experiments on the basis of this distinction (Farrer and Frith, 2002; Jeannerod *et al.*, 2000; Ruby and Decety, 2001; Chaminade and Decety, 2002; Tsakiris and Haggard, 2005). Farrer and Frith (2002), for example, attempt to identify the neural correlates of the sense of agency for one's action. They let subjects manipulate a joystick to move an image on a computer screen during fMRI scanning. Although in each case the subjects move the joystick corresponding to the movements of the image, in some trials the screen movement is caused by the subject and in others, the experimenter causes it. Farrer and Frith argue that this allows for an experimental differentiation between the sense of agency and the sense of ownership since the subject moves in all trials making ownership a constant, while the sense of agency (defined in terms of the subject's sense of control over changes on the screen) changes. The experiments find the neuronal correlates for the sense of agency in the contrasting activation in the right inferior parietal cortex

for perception of action caused by others, and the anterior insula bilaterally when action is experienced as caused by oneself. Setting aside questions about whether agency is clearly distinguished from ownership in this experiment (see Tsakiris and Haggard, 2005, for comments), it is clear that phenomenology has contributed to experimental design in the form of phenomenological distinctions that are empirically testable.

Despite the contrast between front-loaded phenomenology and Varela's neurophenomenological approach, there are two ways in which they are related. First, the phenomenological insights used in experimental design could be those that are developed in previous neurophenomenological experiments. Second, one can consider the neurophenomenological experiment by Lutz *et al.* as a good example of front-loaded phenomenology as well. The choice of stimulus set-up is most likely based on a re-interpretation of classical studies of the appearance of visual shapes (e.g. Julesz, 1971). What makes this experiment different is the built-in realisation that we cannot beforehand know about details regarding the experimental subjects' experiences during the experiment. This is, essentially, a front-loading of phenomenological insight and method into an experimental paradigm.

Introspection

Early forms of methodological introspection were in some cases attempts to access experience simply by turning attention 'inward', as though the task were to observe contents displayed in an interior mental theatre. Introspectionists further assumed that these experiences could be analyzed into atomistic sensory elements. These are assumptions that phenomenology attempts to set aside by using the phenomenological reduction. Phenomenologists do not consider phenomenological method to be introspectionist in the traditional sense, although 'introspection' and 'phenomenology' are often taken to mean the same in experimental contexts. Phenomenologists are interested in phenomenological descriptions of the world as we experience it, and are thus oriented to experienced objects and not necessarily to the subjective nature of experience.

Thus, if introspection is taken to mean a mental operation that allows one to 'intro-spect' one's current mental state, then, according to Zahavi (2003, p. 54), 'it is not at all claims of this type that phenomenology is concerned with, and more generally speaking, phenomenology is not at all interested in establishing what a given individual might currently be thinking about. The phenomenological field of

research does not concern private thoughts, but intersubjectively accessible modes of appearance' (Zahavi, 2003, p. 54). In other words, the phenomenologist isn't interested in the subjects' experiences qua their own private and subjective (psychological) experiences; rather he/she is interested in the intentional nature of experiences (as they are experiences of things, or of others, etc.), and in their shared or universal structure.

In the classical introspectionist experiments (Wundt, 1907) as well as in newer experiments using introspection (Overgaard & Sørensen, 2004), subjects are asked to report directly about their experiences rather than to report about a stimulus. In contrast, the phenomenologist considers experience to be characterized by intentionality — that is, to be directed at things in the world. Experience includes the content of experience. If asked to describe what I am experiencing, part of a full phenomenological description would include a description of the world as it appears to me, and would not be confined to a description of my inner states. This is not to say that the phenomenologist cannot focus on the experiential aspects of consciousness. Any such focus, however, is weighted by what is being experienced. In the experiment by Lutz *et al.* (2002), for example, although the focus was on the subject's state of readiness, the subjective measure of readiness was not something independent of how the stimulus appeared. In responding to the readiness question, the trained subject reported on how the stimulus surprised him, or interrupted his thoughts about something else, or that the stimulus appeared, etc.

Another suggested methodological difference between phenomenology and introspection is that introspection relies on pre-determined categories — that is, categories for report that the researchers decided before the experiment. Subjects are given such experiential categories and are asked to 'choose between them', whereas, in phenomenology, subjects are free to create their own, following the phenomenological reduction. Whereas this may be true for 'old-school introspectionism' as in Wundt (1907) and Titchener (1912), it seems not to be the case in newer versions of introspectionism, where subjects in some instances are asked to create their own experiential categories (as in Overgaard *et al*., 2004; Ramsøy & Overgaard, 2004). Although the goals of phenomenology may be quite different, it is a more controversial claim that their methods are also different. To the extent that the contemporary use of introspective techniques has moved away from sensationalist psychology, the lines between these introspective techniques and phenomenology do not seem to be as clearly drawn.

Although we note this controversy about the distinction between phenomenology and introspection, for the purposes of this paper we set aside the particular question of how phenomenology differs from introspective methods (see Gallagher and Zahavi, 2008, for a more detailed discussion). Instead, our goal is to find a basic set of productive first-person methods regardless of whether they are called introspective or phenomenological. Whereas the approaches reviewed so far all claim the name phenomenology, the methodologies that we consider below claim to be introspective

First Order and Second Order Introspection

Jack & Roepstorff (2002) term first-person methods 'introspection' in accordance with the traditions of Wundt and Titchener, whose methodology for verbal reports founded experimental psychology. The return of introspection as a serious methodology in contemporary experimental psychology is a controversial issue. Since the fall of introspectionism in the early part of the 20th century, introspection has been seen as fundamentally unscientific because of the lack of external validation. Historical classics such as Nisbett and Wilson (1977) have erroneously been taken as evidence that we are unreliable when reporting about the underlying mechanisms behind our beliefs and motives. For this reason, researchers have in general tried to avoid introspection by designing experiments in such a way that subjects never directly report or think about their experiential content; the result is that one can only second-guess what the subject experienced. Today, it is known that the work by Nisbett and Wilson did not discredit introspectionism or first-person methods as such, but rather provided a comprehensive and compelling demonstration that the mental processes responsible for cognitive processes such as judgements, preferences, and even emotions are not accessible to conscious awareness. Rather than calling for a complete abandoment of introspectionism per se, this study should be seen as a clear historical prima facie demonstration of unconscious processes, and not a demonstration that introspection is invalid.

According to Jack & Roepstorff, introspection is unavoidable in practice. Because experimental subjects do not always follow instructions exactly, they argue, we need introspection as a 'supplementary source of information'. They suggest that there are two kinds of reports often used in introspection. One kind is the so-called first-order report in which subjects report about what they are conscious of. The second kind is the second-order report. Second-order

reports reflect an awareness of the subject's own conscious states. However, Jack & Roepstorff do not go into much detail regarding the exact status of introspective reports versus other kinds of reports. The difference between a first-order report and a second-order report seems to be the difference between a non-reflective report, e.g., 'Yes, the light just flashed,' and a reflective report, e.g., 'I saw the light flash just as I was thinking of something else, or just as I was feeling apprehensive.'[5]

Although Jack & Roepstorff provide a careful methodological examination of experimental practice, they do not go into how, precisely, introspection should be practised. They do however say that the introspective report 'should be used with care as it influences cognitive processing'. As such, and as opposed to what e.g. Varela suggests, introspective methods are here applied after using non-introspective behavioural methods. Jack and Roepstorff would thus ask follow-up questions about the untrained subjects' conscious experiences. Jack & Roepstorff further suggest that one may use open or 'semi-open' interviews retrospectively (that is, after experiments) or more closed scaling techniques during experiments.

Jack & Roepstorff take the study by Lutz *et al.* as an example of an introspective approach because the experiment uses introspective evidence (reports about experience) and broader categories based on introspective insights that are eventually translated into quantitative categories. Thus, Jack & Roepstorff make no distinction between introspection and phenomenology, and what they think of as operationalised introspection has important similarities with what is thought of as operationalised phenomenology. That is, the experiment of Lutz *et al.*, which is an explicit operationalisation of neurophenomenology, is here accepted as an operationalisation of the introspective approach of Jack & Roepstorff also. The experiment could be interpreted as an implementation of Jack & Roepstorff's second-order reports, but as Jack & Roepstorff are less explicit regarding methodology than Varela, the similarities and differences are impossible to list.

Experiments on Introspection

In Overgaard (2003), a further account of introspection is outlined, although it shares many similarities with that of Jack & Roepstorff.

[5] On this view, a non-introspective report is not a direct report on experience, but a report on what the subject might think about something that is not a matter of current experience. E.g., that 5 + 7 = 12, or that Newton lived in the 17th century. This, however, contrasts with the definition of non-introspective reports provided below.

The main difference is that in this case introspection has a stronger influence on the experimental design, as shown below.

Overgaard & Sørensen conducted experiments on the difference between introspective and non-introspective reports. This distinction reflects the difference between deliberately attending to the contents of a subject's own consciousness (introspection) and attending to the object one is conscious of ('non-introspection'). Subjects were instructed to identify a briefly displayed stimulus by pointing out its shape, colour and location on three different scales. Before doing so, they were instructed to attend in an introspective or in a non-introspective way. In the introspective condition, subjects were asked to report about the experience of the stimulus and not about what they believed the stimulus actually was. In the non-introspective condition, subjects were asked to guess, and to be as correct as possible about stimulus properties. The instructions were intended to reflect the idea that introspection involves a shifting of attention from the object to the experience, even though the content of the experience is the same object. The responses of the subjects were treated as being either 'correct', 'incorrect' or 'near correct'. 'Near correct'-responses involved only partially correct matches (e.g. when subjects pointed at the same colour as the one presented, but in a brighter or darker tone). It was shown that subjects in the non-introspective condition had significantly more correct *and* incorrect responses, whereas the introspective subjects most often were 'near correct'. In addition, subjects in the introspective condition tended to be more liberal about their reports of, say, colour, while the subjects in the non-introspective condition tended to show a more conservative style and conformed to specific colour categories. For instance, if stimuli are presented in a variety of colours, subjects instructed to report non-introspectively tend to choose the 'medium category' or the most frequently presented category. Subjects giving introspective reports seem less tied to such strategies, but seem instead to overestimate the variability of stimuli and to report having seem stimuli that were never presented.

On the basis of these findings, it is suggested that the researcher should distinguish clearly between reports where subjects introspect and reports where subjects base their report on 'everyday perception'. The argument is that directing of attention towards experience involves different mental processes than directing attention towards a perceptual object.

Similar to the procedure used by Lutz *et al*. (2002), Overgaard (2003) and Ramsøy & Overgaard (2004) asked subjects to use introspection to create their own report categories. The procedure differs

slightly from Lutz's relatively strict recipe, in that the experimenter had little influence on the reporting categories after the subjects' open reports. In the experiment reported in Ramsøy & Overgaard, the subjects created the experimental categories themselves. In a subsequent experiment, the categories were 'exported' to be used by a new group of subjects, where subjects were instructed to conform to the categories only insofar as they gave any meaning in relation to their experiences

Overgaard (2003) suggests that the creation of introspective categories is just one of several possible methods for introducing first-person reports in experiments. One may combine this effort with detailed interviews after the experimental sessions, while keeping in mind that memory decay will affect these reports. The analysis of the result will normally consist in a comparison between groups created by the experimental variable, e.g. differences in stimulus input or in introspective vs. non-introspective report. However, new insights can be reached by regrouping the results based on categories gained from the interview. A realisation of this idea can be found in Roepstorff *et al.* (2004), who compared neural activations related to perceiving and imagining a face. An interview was performed afterwards, revealing that subjects differed in the interpretation of instructions. The experiment revealed a late right ventral visual stream activation in imagination, while posterior visual areas and early left ventral visual stream activations were related to perceiving. These results were found only by regrouping subjects after interview reports.

Overgaard (2003) also mentions the experiment by Lutz as an approach very similar to his own. The training in phenomenological reduction resembles the training in reporting 'directly on experiences' as subjects in both cases spend an extensive time before the actual experiment, learning the difference between reporting about objects and reporting about experiences. The reporting task and training session are substantially similar in these studies, and may be considered basically identical. Furthermore, subjects in both studies were grouped for data analysis based on their experiential reports.

Experiential-Phenomenological Introspection

Donald Price and Murat Aydede (2005) suggest a 'new' methodology of introspection, which they call 'the experiential-phenomenological approach,' based on previous publications by Price & Barrell (1980) and Barrell & Barrell (1975). They present their approach as consisting of two 'phases' — a horizontal and a vertical phase. In the

horizontal phase, four stages are separated out as follows: (1) questioning and observing, (2) describing experiences from a first-person perspective, (3) understanding experiences through discovering common factors and their interrelationships, and (4) application of quantitative methods to test generality and functional relationships between common factors. Price and Aydede claim that the first three steps are unique compared to other experimental approaches because the subject is involved in creating his or her own report categories. As we have seen, however, this aspect of their method is not unique.

The first step involves 'passively observing' a presented stimulus. Contrary to especially Titchener's version of introspectionism, Price and Aydede do not consider consciousness passive per se. Instead, the passive observation is meant as a method to avoid immediate prejudice or presumptive conclusions about what is experienced. It is followed by a retrospective attending that leads to a description of the experience in the following step. Here, Price and Aydede underline the importance of the idea that a full description entails not just a focus on, for instance, the specific, sensory modality that is stimulated, but on all aspects of experience (passing thoughts, etc.). This method, of course, rests on the assumption that there is a limited, clearly identifiable number of conscious states that occur and are available for report during, say, a perception. After this, a step of 'distillation' begins. Here, the experimenter and the subject 'interpret' the report. For example, the report (when stimulated with painful hot water on the hand): 'Is it going to get stronger? Feeling of concern. I hope my hand isn't going to be scalded' can be interpreted as a statement about concern for future consequences. This process aims to generalise the subjective reports in order to arrive at general factors. These factors, Price and Aydede argue, are useful for defining the relevant conscious state as well as for giving functional hypotheses about it. From here, the subject yields to the expertise of the investigator who applies quantitative methods, e.g. counting how often a given report is given etc.

The 'vertical phase' regards the combination of the results from phase one with neuroscientific results. Price and Aydede say very little about this part of the research. They suggest applying standard neuroscientific investigations to single subjects based on their reports, and that these results are compared between subjects in following investigations.

Towards an Integrated Methodology

Anyone familiar with the theoretical and metaphysical discussions in consciousness-studies, knows that it would be difficult to give a comprehensive overview of the large variety of positions that currently exist. Furthermore, the present status of our understanding of the relation between consciousness and brain is characterised by so little knowledge about relevant empirical facts that very few constraints exist to specify what a good theory of consciousness should look like. This makes it possible to have, in principle, as many theories about consciousness as there are theorists.

Although the five proposals presented above distinguish themselves as either 'phenomenological' or 'introspective' methodologies and each claims 'uniqueness', we can find in them a set of common and cohesive rules for the methodologically controlled study of consciousness.

We are not suggesting that there should be a single agreed-upon empirical methodology, but we do think it is possible to find common ground among the various methodological proposals that we have reviewed here. Furthermore, it may be beneficial for researchers who wish to employ first-person methodologies to have a set of agreed upon procedures that may allow for more precise comparisons between studies.

All of the proposed methods reviewed above agree that valuable insights into consciousness can be achieved by examining first-person reports in experimental settings. Varela (1996), Overgaard (2003), and Price & Aydede (2005a) all argue that experimenters should instruct subjects not to employ implicit or explicit theories about consciousness prior to the experiment. Also, they give quite specific instructions that subjects should report freely about their experiences 'as they occur to them', after which more specific categories are created for use in the context of an experiment. Gallagher (2003) and Jack & Roepstorff (2004) agree with Varela, Overgaard, and Price & Aydede that insights into conscious experience should be addressed in experimental settings, and although on Gallagher's model it is not necessary that subjects explicitly report about their experiential state, his concept of front-loaded phenomenology is not inconsistent with the collection of such reports. It is also striking that three out of five explicitly consider the experiment by Lutz and colleagues as more or less a 'direct application' of their ideas; and others (Price & Aydede) could easily have made similar claims..

The existing proposals seem to argue that cognitive science should be enriched by first-person methods at three stages: (1) in the pre-experimental process, (2) in the actual experimental situation, and (3) after the experiment. The pre-experimental processes of experiment design and training should be focused on the 'phenomenological validity' of the concepts and questions being posed, but also on the methods applied (how the subjects are to be trained or instructed, how they should report etc.).

During the actual experiment, the methodologies reviewed here address the importance of the report, and especially consider guidelines to improve and validate the reference of the report to more detailed aspects of our experience — e.g. through techniques of mental focusing, 'getting acquainted' with one's own experience, report training etc. Also, there is an emphasis on open reports rather than pre-determined scales.

Little is said about the post-experimental stage. It is argued that it may be beneficial to collect more elaborate reports (interviews) after the experiment to validate the subjective categories (subjects may re-state how they used their response categories) and to make sure that subjects understood the task correctly. Also, such interviews can be used more directly in the analysis of the quantitative data to form categories for comparison. However, more exact guidelines for doing this are not presented in the reviewed proposals, and perhaps more importantly, nothing is said about data analysis. Should the 'first-person enriched' methodologies be fully integrated with classic quantitative data analysis, or should they be supplemented with a hermeneutical analysis of the content of the reports? This may depend on the particular aims of the experiment, and for that reason it may not be appropriate to provide guidelines that would decide this in advance. It is not so much a question open for debate, as a determination to be made in the experimental settings. From the above we conclude that in principle it should be possible to extract a coherent set of methodological suggestions for use by experimental scientists to study consciousness. We offer the following as the outline of a coherent set of methodological guidelines.

(1) Conceptual distinctions and insights culled from phenomenological or introspective first-person methods should contribute to experimental design and help to define the questions to be investigated.
(2) Although all descriptions of observations are influenced by theoretical assumptions, one cannot, in advance, assume which

experiences a certain experimental set-up may give rise to in a subject. In other words, the character of mental states or experience should not be predetermined by the *subject*. Thus, subjects should be trained to observe and report without introducing theoretical or folk psychological biases.

(3) For the same reasons as stated above, the character of mental states or experience should not be predetermined by the *experimental scientist* investigating them. The scientist should elicit open reports and suggestions for report categories from trained subjects.

(4) Post-experiment interviews should be carried out for retrospective examination of the subjects' experiences during the experiment to gather information too rich or complicated to investigate during the actual experiment. Such interviews can inspire a re-grouping of data and new ways to look at data using quantitative methods. Thus, the interview does not exist in its own right, but as an integrated part of the analysis of the experiment.

Our ambition has not been to suggest a complete and flawless first-person methodology, but one that incorporates suggestions made in the 'phenomenological/introspection' discussions. Nor is it an attempt to re-invent or create a 'new and fundamentally different' science of consciousness. Rather, we have sought out an approach that is relatively specific in making suggestions to scientists on how to go about integrating first-person methods in cognitive science. Since these suggestions have already been used in experiments, they should be easily integrated in the analyses of cognitive science and cognitive neuroscience as those disciplines are currently carried out.

Acknowledgments

Morten Overgaard was supported by The MindBridge project, funded by the European Commission under the Sixth Framework Programme, Contract No. 043457

References

Antrobus, J.S., Singer, J.L. & Greenberg, S. (1966), 'Studies in the stream of consciousness: Experimental enhancement and suppression of spontaneous cognitive processes', *Perceptual and Motor Skills*, **23**, pp. 399–417.

Barrell, J.J. and Barrell, J.E. (1975), 'A self-directed approach for a science of human experience', *Journal of Phenomenological Psychology*, **6**, pp. 63–73.

Braddock, G. (2001), 'Beyond reflection in naturalized phenomenology', *Journal of Consciousness Studies*, **8** (11), pp. 3–16.

Chalmers, D.J. (2004), 'How can we construct a science of consciousness?', in *The Cognitive Neurosciences III*, ed. M. Gazzaniga (Cambridge, MA: MIT Press).
Chaminade, T. and Decety, J. (2002), 'Leader or follower? Involvement of the inferior parietal lobule in agency', *Neuroreport*, **13** (1528), pp. 1975–8.
Crutcher, R.J. (1994), 'Telling what we know: The use of verbal report methodologies in psychological research', *Psychological Science*, **5**, pp. 241–44
Depraz, N. *et al*. (2003), *On Becoming Aware* (Amsterdam: John Benjamins).
Ericsson, K.A. (2002), 'Towards a procedure for eliciting verbal expression of non-verbal experience without reactivity: Interpreting the verbal overshadowing effect within the theoretical framework for protocol analysis', *Applied Cognitive Psychology*, **16**, pp. 981–7.
Ericsson, K.A. & Simon, H.A. (1984), *Protocol Analysis* (Cambridge, MA: MIT Press).
Farrer, C. and Frith, C.D. (2002), 'Experiencing oneself vs. another person as being the cause of an action: the neural correlates of the experience of agency', *Neuroimage*, **15**, pp. 596–603.
Gallagher, S. (2000), 'Philosophical conceptions of the self: implications for cognitive science', *Trends in Cognitive Sciences*, **4** (1), pp. 14–21.
Gallagher, S. (2003), 'Phenomenology and experimental design', *Journal of Consciousness Studies*, **10** (9–10), pp. 85–99.
Gallagher, S. and Sørensen, Jesper Brøsted (2006), 'Experimenting with phenomenology', *Consciousness and Cognition*, **15**(1), pp. 119–34.
Gallagher, S. and Zahavi, D. (2008), *The Phenomenological Mind* (London: Routledge).
Goldman, A. (2000), 'Can science know when you're conscious? Epistemological foundations for a science of consciousness', *Journal of Consciousness Studies*, **7** (5), pp. 3–22.
Goodenough, F.L. (1928), 'Measuring behaviour traits by use of repeated short samples', *Journal of Juvenile Research*, **12**, pp. 230–5.
Hurlburt, R.T. and Akhter, S.A. (2006), 'The Descriptive Experience Sampling method', *Phenomenology and the Cognitive Sciences*, **5** (3–4), pp. 271–301.
Hurlburt, R.T. and Heavey, C.L. (2004), 'To beep or not to beep: Obtaining accurate reports about awareness', *Journal of Consciousness Studies*, **11** (7–8), pp. 113–28.
Hurlburt, R.T., Koch, M. and Heavey, C.L. (2002), 'Descriptive Experience Sampling demonstrates the connection of thinking to externally observable behavior', *Cognitive Therapy and Research*, **26**, pp. 117–34.
Jack, A. & Roepstorff, A. (2003), 'Why trust the subject?', *Journal Of Consciousness Studies*, **10** (9–10), pp. v–xx.
Jack, A. & Roepstorff, A. (2002), 'Retrospection and cognitive brain mapping: From stimulus-response to script-report', *Trends in Cognitive Science*, **6** (8), pp. 333–9.
Jeannerod, M., Farrer, C., Franck, N., Fourneret, P., Posada, A., Daprati, E. and Georgieff, N. (2003), 'Action recognition in normal and schizophrenic subjects', in *The Self in Neuroscience and Psychiatry*, ed. T. Kircher and A. David (Cambridge: Cambridge University Press).
Jultesz, B. (1971), *Foundations of Cyclopean Perception* (University of Chicago Press).
Lutz, A., Lachaux, J.-P., Martinerie, J. and Varela, F.J. (2002), 'Guiding the study of brain dynamics using first-person data: Synchrony patterns correlate with on-going conscious states during a simple visual task', *Proceedings of the National Academy of Sciences of the USA*, **99**, pp. 1586–91.

Merleau-Ponty, M. (1962), *Phenomenology of Perception*, trans. C. Smith (London: Routledge and Kegan Paul).
Nisbett, R.E. & Wilson, T.D. (1977), 'Telling more than we can know: Verbal reports on mental processes', *Psychological Review*, **84**, pp. 231–59.
Overgaard, M. (2003), 'On the theoretical and methodological foundations for a science of consciousness', *Journal of Anthropological Psychology*, **13**, pp. 6–31.
Overgaard, M., Nielsen, J.F. & Fuglsang-Frederiksen, A. (2004), 'A TMS study of the ventral projection streams from V1 with implications for the finding of neural correlates of consciousness', *Brain and Cognition*, **54** (1), pp. 58–64.
Overgaard, M. & Sørensen, T.A. (2004), 'Introspection distinct from first order experiences', *Journal of Consciousness Studies*, **11** (7–8), pp. 77–95.
Pope, K.S. & Singer, J.L. (1976), 'Regulation of the stream of consciousness: Toward a theory of ongoing thought', in *Consciousness and selfregulation*, ed. G.E. Schwartz & D. Shapiro (New York: Plenum), pp. 101–35.
Price, D.D. and Aydede, M. (2005), 'The experimental use of introspection in the scientific study of pain and its integration with third-person methodologies: The experiential-phenomenological approach', in *Pain: New Essays on Its Nature and the Methodology of Its Study*, ed. M. Aydede (Cambridge, MA: MIT Press).
Price, D.D. and Barrell, J.J. (1980), 'An experiential approach with quantitative methods: A research paradigm', *Journal of Humanistic Psychology*, **20**(3), pp. 75–95.
Ramsøy, T.Z. & Overgaard, M. (2004), 'Introspection and subliminal perception', *Phenomenology and the Cognitive Sciences*, **3**, pp. 1–23.
Roepstorff, A., Hohwy, J., Vuust, P., Overgaard, M. & Gjedde, A. (2004), 'Interaction between visual imagery and perception', the *10th Annual Meeting of the Organization for Human Brain Mapping*, Budapest.
Ruby, P. and Decety, J. (2001), 'Effect of subjective perspective taking during simulation of action: A PET investigation of agency', *Nature Neuroscience*, **4** (5), pp. 546–50.
Smallwood, J., Obonsawin, M. and Heim, D. (2003), 'Task unrelated thought: The role of distributed processing', *Consciousness & Cognition*, **12**(2), pp. 169–89.
Smallwood, J., Davies, J.B., Heim, D., Finnigan, F., Sudberry, M., O'Connor, R. and Obonsawin, M. (2004), Subjective experience and the attentional lapse: Task engagement and disengagement during sustained attention', *Consciousness & Cognition*, **13**(4), pp. 657–90.
Titchener, E.B. (1912), 'The schema of introspection', *American Journal of Psychology*, **23**, pp. 485–508.
Tsakiris, M. & Haggard, P. (2005), 'The rubber hand illusion revisited: Visuotactile integration and self-attribution', *Journal of Experimental Psychology: Human Perception and Performance*, **31**(1), pp. 80–91.
Varela, F.J. (1996), 'Neurophenomenology : A methodological remedy to the hard problem', *Journal of Consciousness Studies*, **3** (4), pp. 330–50.
Varela, F.J. *et al.* (1991), *The Embodied Mind* (Cambridge, MA: MIT Press).
Wundt, W. (1907), ,,Über Ausfrageexperiments und über die Methoden zur Psychologie des Denkens'', *Psychologische Studien*, **3**, pp. 301–60
Zahavi, D. (2003), *Husserl's Phenomenology* (Standford: Stanford University Press).

Paper submitted March 2006; revised September 2007