

## Introspections without Introspeculations

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We will divide up our remarks to address three topics discussed in Price and Aydede: pain, introspection as it is currently practiced, and the proposed methodological introspection. We will leave aside any discussion of the interesting metaphysical questions raised in their paper.

### 1. Pain

We have little to say about pain itself. It is clear that although pain is distinguishable from other experiential states, Price and Aydede do not isolate it from those other experiential dimensions (especially the affective). Thus they write:

First, pain, unlike most conscious experiential states such as visual, auditory, tactile experiences, have an immediate affective and emotional aspect to it, which underlies its intimate personal as well as clinical urgency. (This volume, p. ??)

Our ordinary experience of pain, then, is not of some pure painfulness — and we should even say that pain infects our visual, auditory, tactile experiences. When I am in pain, my experience of the world via these various modalities is affected — and indeed, these perceptual experiences do have affective and emotional aspects to them which may be the result of the pain itself. So we agree that pain does not function as an object of our perceptual experience, but infiltrates that experience itself.

Notice that pain here is not the object of our perceptual experience, but rather, it is the experience itself. (This volume, p. ??)

But this also motivates the following question: to what extent does the pain that one tries to introspect actually affect the introspection? This is just the opposite of what might be the more expected methodological question: To what extent does introspection affect (change) the experience of pain (or any experience)?

### 2. Introspection as Already Practiced

The authors argue that introspection is indispensable and that it is already a part of third-person studies. But what is the nature of the introspection that is already practiced in science? There does seem to be a very basic agreement among scientists interested in introspection that it involves a direct attending to the subject's own consciousness, no matter how one would go about defining introspection from there. To quote just a few of the "first generation introspectionists," Knight Dunlap writes "'Introspection' is usually defined in terms which are equivalent to the expression consciousness scrutinizing itself" (Dunlap, 1912: 404). Angell writes: "It [introspection] consists simply in the direct examination of one's own mental processes" (1908: 5). Stratton considers it to be the "direct acquaintance with the state of our

minds which all of us to some extent possess” (1914: 2). Finally, William James characterizes it as: “the looking into our own minds” (James, 1890: 185). Price and Aydede, however, suggest that it is beyond the scope of their paper to examine the nature of introspection, and they are satisfied with some combination of HOP and HOT models (p. ??). They suggest that nothing crucial about their analysis depends on this issue. We disagree, especially in regard to the first part of their paper. For purposes of discussion we will stay with the model they propose, but we note that there is certainly much more to say about whether HOP and/or HOT models genuinely capture the concept of introspection. What’s important here is that whether one appeals to HOP, HOT, or some alternative phenomenological model of introspection, introspection is understood as a reflective second-order cognitive act that thematizes first-order phenomenal experience, and makes that experience the object of reflection.

Price and Aydede claim that, concerning this kind of introspection, “there is absolutely no reason to think that the use of such a first-person approach is scientifically and methodologically suspect.” Especially with respect to what they characterize as the introspection already practiced in experimental settings, however, there may be some justified suspicion. Indeed, and on a more basic level, before we get to the issue of scientific reliability, we think that Price and Aydede’s analysis may reflect a not uncommon confusion about the very nature of introspection and how it is practiced. Indeed, in controlled scientific experiments that require verbal reports, it is not clear at all that introspection is used in any strict methodological fashion. There are really two points here. First, whether the practices that Price and Aydede call introspective are really introspective; second, whether those practices are above suspicion.

According to Price and Aydede, introspection is already practiced in experimental science because “the subjects’ verbal reports [or non-verbal behaviors like button-pushes] about their own cognitive states have routinely been taken as evidence for the cognitive models postulated” (p. ??). First, one might argue that all reports given by subjects are, at least indirectly, about their own cognitive (mental, emotional, experiential) states. If one instructs a subject to push a button, or say ‘now’ when they see the light come on, then the subject is reporting about the light, but also about their visual experience. Even if one instructs the subject in a way that carefully avoids mention of an experiential state: “Push the button when the light comes on,” the only access that the subject has to the fact of the light coming on is by way of her experience of the light coming on. In this sense the first-person perspective is inherent in all experiments that depend on subjects’ reports. One might follow this to its logical conclusion, that even scientific observations made by the experimenter, usually considered as third-person data, presuppose and are tied to first-person reports of the scientist. The scientist might say “The subject’s pre-motor cortex was activated 300 msec before the subject raised her arm.” But that could easily be a report on the scientist’s experienced perception of the instrument that measured the timing of the activation. It would be odd, however, to say that that this third-person fact was based on introspection, although it is a first-person report of the scientist. More generally, however, and less extremely, it is odd to say that the first-person reports of a subject are necessarily introspective, although this is precisely what Price and Aydede claim.

For example, I may ask the subject to say ‘now’ when they see the light come on. How precisely does the subject know when they see the light come on? Do they reflectively introspect their experience looking for the particular visual state of seeing the light come on? Or do they simply see the light come on and report that? One might ask, “How could they possibly report that they see the light come on if they don’t introspectively see that they see the light come on? Is it possible that we can report on what we experience without employing introspection? There

is a long tradition in philosophical phenomenology (specifically the tradition that follows Husserl) that answers in the affirmative. We can report on what we experience without using introspection because we have an implicit, non-introspective, pre-reflective self-awareness of our own experience. At the same time that I see the light, I know that I see the light. This knowledge of seeing the light is not based on reflectively or introspectively turning our attention to our own experience. It is rather built into our experience as an essential part of it, and it is precisely that which defines our experience as conscious experience. On this view, I consciously experience the light coming on just as I see the light coming on. I don't have to verify through introspection that I have just seen the light come on, since my first-order phenomenal experience is already something of which I am aware in the very experience of it.

First-person reports of this kind, then, are not introspective reports. They are pre-reflective experiential reports. So it is not correct to say that from a first-person perspective "conscious experiences seem accessible only through introspection" (p. ??) or "introspection seems to be the only available method of access to qualia" (p. ??). This applies to pain as well. It is not the case that our access to pain phenomena is "only through the special epistemic faculty of introspection" (p. ??). Indeed, introspection on pain is usually motivated only because we already know that we are in pain — and we have that knowledge pre-reflectively, and can report it on that basis, without introspecting it. A stimulus is applied. The experimenter asks, "Is that painful?" I do not have to introspect to say "Yes." I do not have to "observe/believe that such and such sensations" are happening to me (p. ??). I can report directly and immediately on my experience of pain because my access is directly and immediately in the pain experience.

In addition, not all reports are about consciously experienced states. In philosophy and especially in cognitive science, there seems to be agreement, at least to a large extent, that not all mental states are conscious (Marcel 1983). Examples such as blindsight and subliminal perception serve to illustrate that subjects may perform a number of tasks that we normally do not hesitate to call "mental" even though subjects report no conscious awareness of them. Therefore, it seems logical to conclude that not all reports about mental states are introspective, i.e., not all of them are about consciousness.

The second point concerns how reliable or how methodological such experiential reports are. In general and for many cases, these kinds of reports do seem very reliable. If an experimenter applies a stimulus that causes a relatively high degree of pain, or a sensory stimulus that is well above threshold, the subject's report that they experience the stimulus as painful or as clearly present seems above suspicion. Reliability may decrease, however, when the stimulus is closer to threshold, and may depend on the mode of report, or other subjective factors that qualify the report. Marcel (1993), for example, has shown that requests for quick reports of close to threshold stimuli using different modes of report (verbal, eye blink, button push) elicit contradictory responses. At the appearance of a just noticeable light stimulus, subjects will report with a button push that they did see the light and then contradict that with a verbal report. This kind of data, and more generally, uneven or inconsistent data can motivate two different strategies. Most often, following established scientific procedure, data are averaged out across trials or subjects, and the inconsistencies are washed out. Less often, scientists are motivated to take this first-person data seriously and to employ introspective methods to investigate it. The second part of Price and Aydede's paper turns to what is genuinely the use of introspection in such contexts.

### 3. Methodologies of Introspection

So far we have argued that not all verbal reports on experience are introspective reports, and introspection is not the only access we have to experience. Thus we take issue with Price and Aydede's claim that "Introspection is a way — apparently the only way — of coming to know about our experiences and their qualities directly" (p. ??). Even if, however, many first-person reports found in scientific experiments are first-person, non-introspective experiential reports, we do not mean to rule out the usefulness of introspection. The use of introspective reports, that is, self-reports that thematize experience, can certainly provide more information about the subject's experience. In regard to pain, for instance, introspective reports can specify the qualities and subjective measurements of pain. In addition, if done in a methodically controlled way, introspection can address issues pertaining to the reliability of some non-introspective experiential reports.

It will be fruitful to compare and contrast three different models of how to employ a methodical introspection in experimental situations: (1) Price and Aydede's experiential model; (2) what has been called a "new introspectionism," developed by Overgaard, his colleagues, and a number of other researchers (e.g., Marcel 2003 1983; Jack and Roepstorff 2002; see comments by Frith 2002; Gallagher 2002); and (3) the method of neurophenomenology developed by Varela (1996), Lutz, and their colleagues (Lutz *et al.* 2002). All three share the same ambition to improve techniques for subjective reporting in order to gain more insights into the 'subjective pole' in the comparison between objective neural states and subjective conscious states.

#### 3.1. The Experiential Model

Price and Aydede suggest an approach consisting of two stages. First, one is to use a 'horizontal approach' in which an investigator or subject introspectively examines what some or other subjective state feels like. Price and Aydede advise us to avoid speculations about why something was experienced and to focus specifically on how it feels instead, thus avoiding interpreting or judging one's own experiences. To do this, they argue that one should notice experiences passively without controlling attention so that one observes ongoing thoughts, emotions or perceptions as if they were "seen in the periphery of one's visual field." Price and Aydede suggest not only "simple" kinds of experiential states as objects for the introspective examination, but, apart from their main example of pain, they suggest performance anxiety as a kind of mental state that can be studied with their approach.

The introspective examination consists not only of 'inner observation' but also of a description or verbalisation of the observations. Of course, aside from the possibilities presented by those who are poetically blessed, one cannot describe, say, the sensation of coldness with many words. Our ordinary, prosaic linguistic practices have not sufficiently evolved to describe a subjective state in such a way that someone who never experienced coldness himself would get an idea of what that sensation is like simply through the description. To address this scarcity of words, Price and Aydede want their subjects to describe associations and thoughts that may arise in connection with the relevant experience: "Intense burning and throbbing in my hand. Feel bothered by this and slightly annoyed. Is it going to get stronger? Feeling of concern. Hope my hand isn't going to be scalded."

Price and Aydede suggest that scientists should use themselves as subjects. The example of a description of associations that arise when lowering one's hand into cold water was in fact given by one of the authors of the paper. The argument for using oneself, as investigator, as a subject, seems to be that the reports of the investigators are as "subjective" as are the reports of

naïve subjects, and, in this sense, just as valid as experimental data. However, one should not forget that investigators must be assumed to always have certain hypotheses and results they hope to find, and thus they are likely more biased as subjects. Using the same argument as Price and Aydede, one could say that given that investigators and naïve subjects have the same status in terms of validity, one could reduce the possibility of the confounding effects of interpretations and judgments by using naïve (though probably trained) subjects only.

Price and Aydede believe that their approach is compatible with experimental methods found in psychophysics. To integrate their rather open method of describing experiences however, they find it necessary to ask subjects to scale the presence of, say, “a throbbing sensation of pain,” “fear of bodily harm” or some other state described by the subjects themselves during the “open description.” This would in essence make possible a quantification of the descriptions, and, as such, it would make the reports commensurable with cognitive neuroscience. This is the second, “vertical,” aspect of their approach. In classical cognitive neuroscience, one uses stimulus input as an experimental variable. Subjects would be presented with two or more different kinds of stimuli and in order to find the neural activations for perceiving one kind of stimulus, the neural activations caused by the other kinds of stimuli would be subtracted from the first. Thus, the reasoning goes, one will find the essential features involved with perceiving the first kind of stimulus. When using neuroscientific techniques there seems no way around using such a subtractive method even though it has been severely criticised (Friston *et al.* 1996; Overgaard, in press). However, one does not need to define one’s variables based upon different stimuli. One could keep stimulus features constant and only vary the instructions as now seen in an increasing number of studies, or one could define the experimental conditions based on the subjective reports themselves. This latter strategy is suggested by Price and Aydede, and it points to a way of integrating the open, subjective reporting strategy with the methodology of cognitive neuroscience.

Price and Aydede do not stand alone defending this kind of view on subjective reports and their integration with neuroscience. On several occasions, the authors appeal to introspectionism and phenomenology as research directions with similar goals. Within both traditions, in the last decade, new developments have occurred that deserve a comparison with the suggestions of Price and Aydede.

### **3.2. New Introspectionism**

A “new” introspectionist approach to subjective reporting has been put forward in Marcel (1983, 2003), Jack and Roepstorff (2002), Overgaard (2003a), Overgaard, Nielsen and Fuglsang-Frederiksen (2004), and is further developed in Overgaard and Sørensen (in press), and Ramsøy and Overgaard (in press).

In Overgaard (2003b), an outline for introspective reporting is described. It is suggested that one should perform consciousness studies on a metaphysically neutral ground, and that an important reason for the shortcomings of classical introspectionism was the commitment to certain metaphysical claims, e.g., the belief in “elementarism.” It is suggested that one should use introspective reporting in experiments on consciousness, given that non-introspective reporting may reflect non-conscious processing. Furthermore, it is suggested that one should reconsider the use of stimulus conditions as the only variable in experiments in cognitive neuroscience, and instead use differences in instructions or in the subjects’ own reporting as the categories of analysis. This line of thinking corresponds very well with Price and Aydede’s reflections on the use of subjective reporting in experiments as well as in analysis of data.

Ramsøy and Overgaard (in press) presented subjects with a visual identification task using varied durations, and asked subjects (1) to guess what was shown on the computer screen, and (2) to scale how clearly they experienced the image. The steps of the scale, including their definitions, were made by the subjects themselves with the instruction that there should be a 1:1 correspondence between experienced differences and reported differences. After a pilot experiment, in which the subjects developed the scale and became accustomed to using it, the actual experiment was run. The subjects ended up using more or less the same scale (named “the Phenomenal Awareness Scale” or PAS), and for reasons of analysis, the investigators decided to merge the scales to include only the points of the scale that were shared by the subjects. This strategy corresponds almost completely to the proposals of Price and Aydede in the “horizontal stage” of analysis, and in the transformation from the horizontal to the vertical strategy.

In Overgaard, Nielsen and Fuglsang-Frederiksen (2004), PAS was used with different subjects when using a similar visual display, and coupled with transcranial magnetic stimulation and EEG. This study aimed to identify the involvement of the ventral projection streams from primary visual cortex in visual consciousness.

In effect, the approach of “new introspectionism” (described in more details in Overgaard 2003b) shares all important features with the approach of Price and Aydede. The subjects started out using their own terminology, which then was used for the purpose of scaling the subjective reports, and finally, it was integrated with neuroscience to search for neural correlates of consciousness.

There are some minor differences between the two approaches as well. Price and Aydede seem more optimistic about which mental phenomena one can study with their suggested approach. Yet, during the horizontal stage, a phenomenon like performance anxiety would give rise to many different associations and thoughts, with the result that it would be almost impossible to tell whether the very different subjective reports basically reflect identical conscious states. Even in the example of the experience of coldness, as mentioned above, the “spontaneous utterings” of the subjects are so relatively different that the investigators must perform some amount of interpretation of the reports in order to create categories suitable for quantitative analysis. Such a post hoc analysis, of course, shares all the problems of the creation of reporting categories in advance of an experiment.

A further line of research using introspective reports aims to identify differences between reports that are specifically about “how” something is experienced and reports about “what” is experienced. In Overgaard and Sørensen (submitted), subjects were presented with a simple design for visual stimuli. On one of three possible locations, a simple figure followed by a mask would appear. The figure was either a triangle, a square, or a circle, or some variation of one these figures (e.g., a half-circle, an upside-down triangle, or a combination of two figures). The colour was either blue, green, or red, although the hue varied. The subjects were to identify the displayed figure by pointing at the corresponding figure drawn on three scales: one for stimulus shape, one for colour, and one for the location. The scale of shapes consisted of a display of 34 different figures, some of which were included in the data material. The scale of colours consisted of eight different levels of hue for the colours. As with the shapes, only some of the colours were actually included as stimuli. The scale of positions displayed the fixation cross in the middle and the three different locations where the stimulus could occur. The responses of the subjects were treated as being either “correct,” “incorrect,” or “near correct.” “Near correct”-responses partially matched stimulus in a manner that was only partially correct (e.g., when they pointed at the same colour as the one presented, but in a brighter or darker tone). The results of

the data analysis showed 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 conforming to specific colour categories.

These results open up questions such as to what degree and how precisely introspection might change (visual) experiences. It seems necessary to address the issue if or how this knowledge should change our way of using introspective reports.

### **3.3. Neurophenomenology**

A third approach, neurophenomenology, as espoused by Francisco Varela (1996), follows the phenomenological tradition initiated by Husserl. This view involves training both the scientists and the experimental subjects in phenomenological method, including use of the phenomenological reduction, that is, the setting aside or “bracketing” of opinions or theories that a subject may have about their experience. This method involves shifting our attention from what we experience to how we experience. This correlates well with Price and Aydede’s advise to avoid speculations about why something was experienced and to focus specifically on how it feels.

Lutz et al. (2002) employ the neurophenomenological method to study the highly variable successive brain responses to repeated and identical stimulations in many empirical testing situations that target specified cognitive tasks. Their hypothesis is that this variability is generated in mental fluctuations due to the subject’s attentive state, spontaneous thought-processes, strategy decisions for carrying out the task, etc. These subjective parameters include distractions, cognitive interference, etc. To control for such subjective processes is difficult and they are usually averaged out across a series of trials and across subjects. Lutz and his colleagues decided to take these subjective parameters more seriously. They combined a process of trained phenomenological reflection with the dynamical analysis of neural processes measured by EEG in a paradigm involving a 3D perceptual illusion. Importantly, Lutz and his colleagues used the introspective first-person data not simply as more data for analysis, but as contributing to their analytic framework.

Phenomenological training in this experiment consisted in training subjects to deliver consistent and clear reports of their experience through a reflective introspection. The goal of phenomenological reflection is to gain intuitions of the structural invariants of an experience, not to average them out. Phenomenological reflection can be either self-induced by subjects familiar with it (not unlike Price and Aydede’s proposal that the scientist use herself as the subject), or guided by the experimenter through open questions — questions directed not at opinions or theories, but at experience. Again, this resembles the “open description” discussed by Price and Aydede. Rather than employing pre-defined categories, and asking “Do you think this experience is like X or Y or Z?” the open question asks simply, “How would you describe your experience?” Open questions posed immediately after the task help the subject to redirect his/her attention towards the implicit strategy or degree of attention he/she implemented during the task. Subjects can be re-exposed to the stimuli until they find “their own stable experiential invariants” to describe the specific elements of their experiences.

In a series of preliminary or practice trials, the subjects developed descriptions (refined verbal reports) of the subjective parameters while engaged in a depth perception task. Subjects thus became knowledgeable about their own experience and developed descriptions of experiential invariants on the basis of open questions, reporting on the presence or absence or

degree of distractions, inattentive moments, cognitive strategies, etc. On the basis of these first-person introspective descriptions, descriptive categories were formulated a posteriori to create phenomenologically based clusters that are then used as analytic tools in the main trials. For example, with regard to the subject's experienced readiness for the stimulus, the results specified three readiness states: steady readiness (SR), in which subjects reported that they were alert and well-prepared as the task began; fragmented readiness (FR) in which subjects reported that they were prepared less "sharply" (due to a momentary tiredness) or less "focally" (due to small distractions, etc.); and unreadiness (SU) in which subjects reported that they were unprepared as the task began. Subjects then used these categories to report their readiness state during the main trials as the experimenters recorded the electrical brain activity. The first-person reports were correlated with both behavioral measures (reaction times) and dynamic descriptions of the transient patterns of local and long-distance synchrony occurring between oscillating neural populations. Using these correlations, Lutz et al. were able to show that distinct subjective parameters correlate to specific dynamic brain patterns just prior to presentation of the stimulus. The results were significantly different relative to results based on averaging across trials.

The experimental protocol used in Lutz et al. (2002) thus employs a practical phenomenological method. The subjects are asked to provide a description of their own experience using an open-question format, and thus without the imposition of pre-determined theoretical categories. They are trained to gain introspective intimacy with their own experience. Their first-person introspective reports are then intersubjectively and scientifically validated both in setting up the phenomenological clusters and in using those clusters to interpret results that correlated with objective measurements of behavior and brain activity.

#### **4. Conclusion**

These three approaches share a number of common features:

- (1) Use of preliminary trials or pilot experiments to train subjects and to develop introspective or phenomenological descriptions of experience or subject-developed scales (Lutz, Overgaard).
- (2) A pushing aside of theories or speculations in favor of attending to how experience is happening (Price and Aydede's avoidance of speculation; Varela's phenomenological reduction).<sup>1</sup>
- (3) The use of open questions to develop a description of the experience (Price and Aydede's "open description"; Lutz's open questions).
- (4) The formulation of common categories that transform first-person introspective descriptions into intersubjectively verified and commonly understood reports (Lutz's phenomenological clusters; Overgaard)
- (5) The use of these phenomenologically generated categories not just as data, but also as part of the analytical instrument (Price and Aydede, Overgaard, Lutz).
- (6) The integration of first-person data with third-person behavioral, psychophysical, and neurological measurement (EEG, TMS, PET, fMRI) in search of correlations among experiences, brain activity, and behavioral responses (Price and Aydede, Overgaard, Lutz).

Putting all of these elements together may provide a fuller and more detailed conception of how a methodical introspection could work than found in any one of the models. Perhaps a

more integrated model that recognizes the precise difference between introspection and first-person, pre-reflexive, experiential reports is now called for.

## Notes

<sup>1</sup> Price and Aydede's use of subjects unfamiliar with the distinction between first and second pain or the hypotheses of the study would not be sufficient to rule out all theories or speculations they might have about the experience. The use of naïve subjects contrasts very clearly with their suggestion to include investigators among the subjects, which "cannot fail to help interpret the data in a more accurate and detailed way" (p. ??). In both cases, a proficient practice of phenomenological reduction would be appropriate. We note that Price and Aydede's characterization of the phenomenological reduction as related to making descriptions more concise ("Part of the process of so-called 'phenomenological reduction' consists in an attempt to capture experiences in this more concise way" [??]) is not part of the traditional definition of the reduction. Conciseness is not the issue in this context. Rather, one understanding of the phenomenological reduction is what motivates us to put aside any discussion of the metaphysical considerations that Price and Aydede seem at pains to address. All such considerations are simply bracketed as irrelevant to the experimental process. The "indispensability of introspection, and first-person methods in general, in the scientific study of pain" can be totally divorced from having to make any metaphysical decisions about the nature of the mind, dualism, identity theory, etc., and is totally neutral in this regard. We do not have to adopt a metaphysical position in order to justify the use of introspection. Nor do we have to try to make subjectivity "metaphysically kosher" in order to put it to work in science. Price and Aydede miss the main point of the phenomenological reduction if they think that these metaphysical issues do have to be addressed in this context.

## References

- Angell, J.R. (1908). Psychology, 4<sup>th</sup> Ed., New York: Henry Holt & Co.
- Dunlap, K. (1912). "The case against introspection," Psychological Review, 19: 404–413.
- Friston K. J., Price C. J., Fletcher P, Moore C, Frackowiak R. S., and Dolan R. J. (1996). "The trouble with cognitive subtraction," Neuroimage, 4: 97–104.
- Frith, C. (2002). "How can we share experiences," Trends in Cognitive Sciences, 6(9): 374.
- Gallagher, S. (2002). "Experimenting with introspection," Trends in Cognitive Sciences, 6(9): 374–75.
- Jack, A. I., and Roepstorff, A. (2002). "Introspection and cognitive brain mapping: from stimulus-response to script-report," Trends in Cognitive Sciences, 6(9): 333–39.
- James, W. (1890). Principles of Psychology, New York: Dover.
- Lutz, A. Lachaux, J.P., Martinerie, J., and Varela, F. (2002). "Guiding the study of brain dynamics by using first-person data: synchrony patterns correlate with ongoing conscious states during a simple visual task," Proceedings of the National Academy of Sciences USA, 99(3): 1586–1591.
- Marcel, A. J. (1983). "Conscious and unconscious perception: Experiments on visual masking and word recognition," Cognitive Psychology, 15: 197–237.

- Marcel, A.J. (1993). "Slippage in the unity of consciousness" in G. R. Bock and J. Marsh, J. (Eds.), Experimental and Theoretical Studies of Consciousness (Ciba Foundation Symposium 174), New York: John Wiley & Sons, pp. 168–180.
- Marcel, A.J. (2003). "Introspective report: Trust, self knowledge and science." Journal of Consciousness Studies, 10(9/10): 167–86.
- Overgaard, M. (2003a). "On the theoretical and methodological foundations for a science of consciousness," Bulletin fra Forum for Antropologisk Psykologi, 13: 6–31.
- Overgaard, M. (2003b). Theoretical and Empirical Studies of Consciousness, Ph.D. thesis, University of Aarhus.
- Overgaard, M. (in press). "Confounding factors in contrastive analysis," Synthese.
- Overgaard, M., Nielsen, J. F., and 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): 58–64.
- Overgaard, M., and Sørensen, T. A. (submitted). "Introspection distinct from first order experiences," Journal of Consciousness Studies.
- 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," this volume.
- Ramsøy, T. Z., and Overgaard, M. (in press). "Introspection and subliminal perception," Phenomenology and the Cognitive Sciences, 3(1).
- Stratton, G. M. (1914). Experimental Psychology and its Bearing on Culture. New York: Macmillan.
- Varela, F.J. (1996). "Neurophenomenology: A methodological remedy for the hard problem," Journal of Consciousness Studies, 3(4): 330–349.

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## Sensation and Methodology

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Price and Aydede defend an experimental design in the field of neuro-physiological psychology wherein correlations are sought between the data of brain activity as measured, observed, and/or detected in third-person reports and the conscious experiences as such of the experimenter presented in first-person reports. The data in the form of first-person experiences of the experimenter are then generalized and replicated, according to the authors, by the verbal reports and reactions of other experimental subjects, viewed as having experiences analogous to the experimenter's own.

The position and expectation of the authors is that such experiments would constitute a way to study psycho-physical correlations, they could thereby be used to refine and revise the explanatory hypotheses for such correlations (in the tried and true way of scientific research), and thereby replicated and confirmed. Are there any reasons to think such an experimental design is improper? Are there any methodological grounds for thinking so (grounds of what constitutes proper and replicable scientific research) or any broader, quasi-philosophical grounds for thinking such an experimental design is not "kosher," as the authors put it.

The central intent of Price and Aydede is to remove both the methodological resistance to the experimental design imagined above within what they call the "intuitive framework" that brain scientists adopt when considering such proposals. They also dismiss some of the broader philosophical objections by defending the experimental design as, in effect, neutral between physicalism and dualism, seen as the competing metaphysical frameworks for current philosophy of mind.

Their specific focus in this article is on the study of pain phenomena. They take such phenomena as paradigmatic of the study of conscious sensations, experiences, or qualia. They trace some of the intuitive framework that provides the main resistance to the study of sensations by such first-person reports and the use of introspection to the rise of behaviorism in psychology, especially in the post World War II period, which saw both a massive expansion of psychological research and an effort to dismiss the introspective tradition in psychology.

The comments to follow are mostly about this "intuitive framework" and its resistance to introspection. I concede the authors' challenge to dogmas about experimental design reflecting latent or unquestioned behaviorist assumptions. I do think, however, there may be more than that lying within the worries about the experimental design they propose. My suggestions may explain why such resistance outlives behaviorism. My comments are then about the more difficult, broader issues.

I will at the end turn to a briefer section on the authors' appeal to the phenomenological tradition in their defense of how to carry-out the first-person experimental component. My aim in that second part is of necessity limited. I only wish to set out some further details about the phenomenological tradition for the purpose of perhaps shedding more light on the very issue that is behind my first set of comments, namely how to conceive of the relation between philosophical and scientific questions in this area.

The main idea of Price and Aydede is that introspection of conscious mental experience can, by way of verbal reports of such experiences, be scientific evidence for objective facts of the matter, namely the objective facts concerning the systematic correlations in human behavior that the authors call “psychophysics.” It is the study of lawful relations between external stimuli (both bodily and environmental) and conscious sensations. They hold that given this project there is no good reason to believe that the first-person reports are not compatible with the evidence of the traditional third-person experimental techniques. Some areas of neurological and psychological research simply have conscious experience as an object of study and if they wish to be scientific, then they may proceed as outlined above.

The resistance to this proposal rests, in my view, upon an asymmetry between the two sets of data. The data concerning the brain states (the data gained through brain imaging techniques, for example) can be revised and refined. I mean that given any hypothesis concerning such states or given any results of applying these techniques to detect those states, we can picture how those results would lead to a thorough going revision and refinement of the initial hypotheses used to collect the data. I do not mean that the brain imaging technique itself would be challenged or that the data would be found to be in some way corrupt (though both of course could occur), but the experimenter would have the option to reinterpret the data in a certain way as a response to the results. For example, the evidence for a correlation could be treated as needing to be revised because a brain state was wrongly identified and, as it turns out, should now be taken to correlate with a quite different sensation. Or perhaps the initial identification simply needs to be refined since the data can be interpreted as showing that distinct brain states had been mistakenly grouped together and further testing may specify the right match. I don’t believe there is anything very contentious or creative here (at least on my part), since what I am describing is very much the art and skill of experimental testing practiced throughout the sciences.

But the first-person reports about the sensations in the above design, or more precisely the experimenter’s direct sensations as such, simply can not be pictured as either revisable or refineable in this way. We can not imagine, I suggest, that the experimenter could be led by some persistent or even robust brain imaging results to the conclusion that such and such an experience that he or she is now having is not in fact a pain experience after all; or that the diffuse pain felt in that testing was in fact a sharp pain after all, given the experiment’s third-person results.

I assume that the experimental design could already rid us of ambiguous pain sensations. Thus I do not mean that it is just hard to make the qualitative discrimination in question. Also, we could imagine or picture an experimenter revising or refining the interpretations of the verbal reports of other experimental subjects, within limits I suppose, to accommodate persistent third-person results about the subject’s brain activity. For example, there may be a way to recommend that experimenters change their understanding of their subject’s verbal reports in such and such an experimental situation given some persistent or robust imaging data. What I am claiming we can not imagine is that the experimenter engaged in making these reports says to himself (in the spirit of revision and refinement); “I am not feeling a diffuse pain after all, what I had been feeling all long is a sharp pain. I apparently misunderstood my own self-report.”

What is behind the asymmetry is the simple but deep point that the having of an experience (putting aside the verbal reports of others for the moment) is conceptually, as we might put it, not available for further revision or refinement. In fact the authors almost assert this point when they state: “Insofar as pain science is in the business of discovering the brain

mechanisms underlying pain experiences accessible only through introspection, pain science is in fact irremediably committed to using first-person methods” (Price & Aydede, p. ??).

What would justify treating that data of introspection as fixed in this way and specifically not subject to revision or refinement? The authors downplay this worry since they present the experiment as committed to a complex method only part of which includes first-person reports. But if my comments above are defensible, the experimental design is committed not just to including first-person reports, but to the stronger position that introspective data are autonomous from revision by third-person reports. Here is where I think we find the core of resistance to this proposal and perhaps the core intuition behind the “intuitive framework.”

There is perhaps a philosophical doctrine behind this asymmetry. The so-called “transparency of consciousness” has, for instance, been appealed to in the history of philosophy as both an intuitive certainty to some and a surreptitious dogma to others. But such a limit could also be thought of as simply stipulated by the experimental design. The authors may be suggesting as much since the stipulation would state that when doing psychophysics of a certain sort one ought to treat first-person reports as closed to further revision and refinement.

But the asymmetry behind this stipulation cries out for some defense. For instance, in research into decision-making and rational-choice, which often parallels the design proposed by the authors above, results can still involve the refinement and revision of the very first-person reports that I claim can not occur in the sensation cases. For example, the experimenter may attribute various beliefs not currently noted by the subject or introduce some auxiliary mechanism, such as belief perseverance, which allows for reinterpretation of the subject’s reported reasoning in a fashion that also allows for the refinement and revision cited above. In such cases of experimentation there is no stipulation to simply take the subject’s response, even noted introspectively, as fixed and protected from further methodological revision and refinement. I have suggested that the design parallels break down when first-person reports are of sensory qualia. But it is precisely that feature that the authors have selected as the key to this new field of psychophysics.

There are examples in science of results being stipulated as invariant (most famously perhaps, the speed of light in the theory of relativity), but these cases emerge as conclusions from broad theoretical reflection, not as a methodological constraint on how the data is collected to begin with.

I stressed that the authors echo my point when they proclaim that they are “irremediably committed to using first-person methods.” But what makes for such an “irremediable” commitment in my view is that the proposed discipline of psychophysics, as presented in the article, bridges two fundamental conceptual schemes for understanding the world: the scheme for physical objects and that for persons. Though such schemes share features in common, they diverge fundamentally with respect to what is involved in conceiving of a being as “minded” versus merely thing-like. Specifically with regard to my point above, denying “mindedness” to a being (or what amounts to the same thing, namely questioning the report of how a sensation seems to that being) amounts to denying that the conceptual scheme for persons is appropriate to that being. But this shift in concepts is a quite different matter from discovering contingent matters of fact holding for an area of reality, and it does not result from further refinement and revision. Rather, conceptual schemes are the preconditions, as we might put it, of thinking about or inquiry into any object or person whatsoever.

In a footnote, Price and Aydede present their approach as involving “two very different ways of representing one and the same phenomenon, say, pain: one under its scientific

description, the other introspectively” (p. ??, n. 6). I do not dispute that way of presenting their approach, but if I am right the “two very different ways or representing” are not alternative descriptions of some objective matter of fact, rather they are two different kinds of representation that make possible the determination of what are the objective matters of fact. It can not be assumed, uncontentiously, that the extension of these concepts are meshing or co-referring. Therefore, they also can not be treated as simply matters to be harnessed together by way of correlations, no matter how strongly supported. The search for correlations is a way to study the ubiquitous regularities in the world, but to represent them as correlations already requires their proper conceptualization.

Am I just restating the position of dualism (which the authors claim can peacefully co-exist with their design)? I do not believe that is my point. I am not making any proposal about what ontologically is or is not the stuff of the world, I am making a point about how we understand and make sense of the world.<sup>1</sup> I am confident that the world is knowable to a reasonable degree of confidence, but that optimism does not support a ban on conceptual constraints over inquiry. These constraints are, for example, like those of logical form, or like those of transitivity, identity, and number. Thus I am not building into what I have said any quirky views about epistemology or ontology when I speak of conceptual schemes.

Of course I am quite sure that brain scientists would be very unhappy with my way of defending their intuitions against first-person reports. While I am convinced that something like this idea lies within their “framework” and lies behind their resistance to the experimental design of Price and Aydede, I did not seek to capture the rough and ready reliance upon empiricism throughout the sciences.

Price and Aydede also appeal to the phenomenological tradition in their account of how the so-called “horizontal approach” to reporting of sensations from the first-person perspective can be the result of what the authors call “passive attending.” This point opens a rather large matter which I can only comment upon briefly. First, there is not a consistent view of the so-called phenomenological tradition. Second, there is not a consistent view among those identified with this tradition as to what the phenomenological method is and specifically what it has to do with on-going psychological research. Third, there is a separate question that the authors are not directly concerned with, though I believe it to have been the key motivation for the so-called phenomenological movement; is philosophy autonomous from the social and natural sciences (and specifically autonomous from psychology)?

The article centrally appeals to Maurice Merleau-Ponty who does treat phenomenology as a way to reform psychological research. Edmund Husserl, on the other hand, is often clearer and more persuasive in holding that psychology is neither a foundation for nor a replacement of philosophy. Thus Husserl presents the phenomenological method, which I will not try to characterize now, as a way to do philosophy, not as a competitive method for the sciences. In fact, Husserl holds that in the scientific study of the “psychophysical nexus of nature” (Husserl, 1965:86) all psychological facts are simply objective, determinable facts of nature. But Husserl also holds that there are “decisive arguments to prove that physical natural science cannot be philosophy ... can never in any way serve as a foundation for philosophy” (Husserl, 1965: 87). He then proposes a way to do the philosophical work of clarification he thinks precedes and is thereby presupposed by the sciences, including psychology. He specifically distinguishes philosophical from scientific inquiry by showing that philosophical results hold independently of contingent matters of fact about the world.

While I grant that this issue is not one Price and Aydede discuss, I believe it bears upon my criticism of their experimental design. First, Husserl is defending the notion that there are conceptual-constraints upon having any experience whatsoever. He thinks these “discoveries” with respect to what makes any experience whatsoever possible are not empirical matters of fact. Second, Husserl thinks, more controversially, that the proper way to investigate these conceptual conditions for any possible experience is by careful attention to mental experience as such, while bracketing judgments about the reality of either the object of experience or any correlated matters of fact with respect to experiences. It is this controversial proposal that leads Husserl to call his method “phenomenology.” Finally, Husserl’s approach leads him to think that what is most important to criticize in the sciences is the uncritical adoption of philosophical positions within scientific research. The authors’ notion that the method they propose is neutral between physicalism and dualism is rightly in the spirit of Husserl’s notion of bracketing such assumptions, but Husserl’s concern is with what conditions scientific research a priori, not what is methodologically required. Thus Husserl does not think the phenomenological method, whatever else it is, is a method for the psychological sciences or any science at all.<sup>2</sup>

I am not recommending Husserl’s approach which I consider flawed, but only pointing to some degree of convergence with my criticism above. Also I am stressing that both the phenomenological tradition and the so-called phenomenological method remain matters of considerable controversy.<sup>3</sup>

In conclusion, by appealing to the phenomenological method or tradition Price and Aydede do not end up supporting their argument about the role of first-person reports. Their overall viewpoint remains within what Husserl would have considered a “naturalistic assumption,” namely that psycho-physical correlations explain and account for the self-certainty of mental states. But they agree with Husserl that such correlations, if they were borne out by empirical inquiry, would be, at least to some extent, philosophically neutral. But Price and Aydede make their case for that result on the basis of the kind of data involved and what is methodologically required in scientific research, not by appealing to the autonomy of philosophy from the sciences.

## Notes

<sup>1</sup> While the view I sketch requires a great deal more defense, I am at least in good company since both Donald Davidson (1980) and John Searle (1984) hold that physicalism (of a certain sort) is compatible with the claim that, as Davidson puts it, “mental and physical predicates are not made for one another” (Davidson, 1980: 218). Searle develops a view, the details of which need not delay us here, distinguishing self-referential concepts from physical concepts. Thus, this idea of distinct conceptual schemes is not committed to dualism (though it is compatible with it), and yet it does not permit empirical evidence of correlations of the sort the authors defend. Also see D’Amico (1997).

<sup>2</sup> Of course Husserl (1965) uses the word “science” when discussing philosophy in a way that was traditional in German philosophy of his time. Though confusing in English, when Husserl calls philosophy a “rigorous science” he is not proposing that his method for the study of philosophy is a method for either the natural or social sciences, quite the contrary.

<sup>3</sup> For a taste of this dispute see Steven Crowell (2002) which is in part a criticism of D'Amico (1999). I have an as yet unpublished response to Crowell under the title "Misunderstanding the Problem of Philosophical Methods."

## References

- Crowell, Steven (2002). "Is There a Phenomenological Research Program?" Synthese, 131: 419–444.
- D'Amico, Robert (1997). "Impossible Laws," Philosophy of the Social Sciences, 27: 309–327.
- D'Amico, Robert (1999). Contemporary Continental Philosophy, Boulder: Westview Press.
- Davidson, Donald (1980). Essays on Actions and Events, Oxford: Oxford University Press.
- Husserl, Edmund (1965). Phenomenology and the Crisis of Philosophy, New York: Harper Torchbooks.
- Searle, John (1984). Brains, Minds, and Science, Cambridge, Massachusetts: Harvard University Press.

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## **Pain: Making the Private Experience Public**

*Robert C. Coghill*

The experience of pain provides a compelling model system for the study of how neural mechanisms support conscious events. It possesses a set of unique attributes including limited representational content, neural correlates which are objectively assessable, and marked subjective variability. Furthermore, the development of a better understanding of both the pain experience and methods for communicating that experience has substantial practical importance. Subjective reports of pain are currently the best indicator for treatment in clinical situations, and alteration of that subjective experience is a central goal of pain therapy.

### **1. Limited Representational Aspects of Pain**

As Price and Aydede point out, many perceptual states (i.e., vision) are predominantly representational, while pain is not the object of a perceptual experience, but is the experience itself. In other words, while being burnt with a 51°C stimulus, one is not aware of the thermal qualities of the stimulator, but is simply experiencing pain. In contrast, while one is being stimulated with a 40°C warm stimulus, one attributes the sensation of warmth to the external object (i.e., the stimulator).

The minimal representational content of pain vs. the highly representational content of vision is clearly reflected in their respective nervous system mechanisms. Visual systems are associated with enormous amounts of neural hardware (the entire occipital lobe and significant portions of parietal, temporal and frontal lobes). Much of this hardware is almost certainly devoted to highly complex signal processing involved in the construction of a neural representation of a highly complex outer world. Distinct features are processed as visual information proceeds serially through various regions of the occipital cortex and rostrally into the parietal and temporal lobes. In the case of pain, the core afferent information — how rapidly/badly is the tissue being damaged and where on/in the body is that damage occurring — is relatively simple and very likely requires minimal signal processing to generate appropriate responses and experiences. For example, minimal transformations in neural information related to the intensity of a noxious stimulus occur as it is transmitted from a peripheral nerve, to the spinal cord, and to the brain. Importantly, neural responses at all levels in this afferent transmission closely mirror subjective reports of pain magnitude (Price 1999). Furthermore, the simplicity and absence of major serial transformations of core information about noxious stimuli may contribute to the preservation of subjective availability of pain following significant damage to numerous central nervous system sites important somatosensory processing (see Coghill *et al.* 1999 for a more complete discussion).

### **2. Operational Dualism in the Study of Pain**

Since the days of Sherrington, neurophysiologists who study pain have engaged in a form of operational dualism in which they draw clear distinctions between the conscious experience (pain) and the reduced physical (i.e., neural) mechanisms responding to and encoding

information about actual or impending tissue damage (nociception) (Sherrington 1908). For example, after an injection of capsaicin (the active ingredient in chili peppers) into my skin, I experience substantial, intense, unpleasant burning pain in skin regions in and around the injection site. In this instance, this particular experience is initially caused by the activation of a population of a certain type of peripheral nerve cells (C-polymodal nociceptors) which project into the spinal cord. This nociceptive information is processed by nociceptive neurons and eventually distributed to numerous sub-cortical and cortical sites within the brain where (presumably) the conscious experience of pain arises.

As physical events (neural discharges, neurotransmitter release, biochemical changes in the intracellular milieu of neurons), nociceptive processes can be readily examined with objective methods. However, accessing the first person experience of pain from an objective third person perspective has remained difficult. Objective, external referents that are readily available to third person observers often provide misleading and/or inaccurate information about the first person experience. Painless, yet massive tissue damage without pain can occur in individuals with congenital analgesia, who for a variety of neurological reasons are unable to experience pain (Baxter and Olsezewski 1960). Similarly, normal individuals injured during situations of great duress (i.e., combat) may not report pain despite substantial tissue damage (Beecher 1959). Conversely, patients with certain forms of central nervous system damage may develop chronic pain (termed central pain) and have the perception of pain and tissue damage arising from a perfectly healthy body region (Dejerine and Roussy 1906).

Using a purely behaviorist approach to infer a first person experience of pain from a third person perspective has long been rejected by scientists who study pain and/or nociceptive mechanisms because the presence of nociceptive responses does not necessarily indicate that the subject is experiencing pain. For example, nociceptive responses in the form of reflex withdrawals can be elicited when a noxious stimulus is applied to the hindpaw of a rat or dog (or lower limb of a human). When the lower (lumbo-sacral) spinal cord is disconnected from the brain by surgical transection at a higher (thoracic) level, these reflex withdrawals are still present. Moreover, these spinally mediated reflexes are surprisingly well coordinated (Sherrington 1910). The withdrawals still become more vigorous as the stimulus becomes more intense. The leg opposite to the stimulated site extends as if to better support the body as the stimulated leg is withdrawn. These withdrawal responses can also be exquisitely modulated by stimulation of other body regions to easily produce the outward appearance of a logical, conscious decision about the best motor plan for escaping from the noxious stimulus (Morgan et al. 1994). Obviously, in the case of the spinal cord transected human subject, such reflex withdrawals occur with no verbal report of a pain experience, indicating that the nociceptive information has not been sufficiently processed to elicit a subjectively available conscious experience.

Given that both the physical condition of the body and the behavior of the subject provide a third person observer with a vastly incomplete and quite possibly erroneous view of that subject's experience of pain, the pain scientist is compelled to follow two possible courses of action. The first course of action consists of disregarding the experiential aspect of pain in its entirety and focusing solely on nociceptive processing. This course is taken by the vast majority of scientists who use animal models to study the pharmacology, neurochemistry, anatomy, and neurophysiology of nervous system nociceptive mechanisms thought to contribute in some way to the experience of pain. As Price and Aydede emphasize, the second course of action involves

studying some aspect of the experience of pain using methods that rely necessarily on introspection.

### **3. Introspection and Psychophysics**

The history of pain research is rich with examples of investigations that were based on first person introspective methods in which the subjects were the experimenters. However, such methods have fallen out of favor as the field has become progressively more aware of how inter-individual differences can skew the results of studies based on a highly limited number of individual subject/experimenters. Advances in the field of psychophysics contributed substantially to the decline of the purely first person investigation. By providing a standardized framework in which to communicate discrete dimensions of a conscious experience, psychophysical techniques enable pain scientists to collate the introspective reports of large numbers of subjects and to make inferences about how various manipulations elicit consistent responses in human populations.

Introspective, psychophysical methods are essential for the study of pain, given the highly individual nature of the experience. In sharp contrast with vision, subjective reports of pain evoked by a given stimulus may vary wildly from one individual to the next. Some individuals are highly sensitive while others are remarkably insensitive. In one of our recent studies of 17 human subjects, subjective reports of pain intensity ranged from 1.05/10 to 8.9/10, despite the fact that each individual received an identical 49°C heat stimulus (Coghill *et al.* 2003). In the face of such widely varying subjective reports of pain, the pain scientist (and often the pain clinician) is forced to wonder if these different psychophysical ratings actually reflect interindividual differences in the subjective experience of pain or if they are simply a confound of individual differences in scale usage or introspective capacity. In order to identify objective correlates of these differing subjective experiences, we imaged brain activation while these different individuals experienced pain. The six most sensitive individuals were directly compared with the 6 least sensitive individuals (the 5 in the middle were excluded from analysis). The highly sensitive individuals activated several brain regions significantly more frequently and more robustly than the insensitive individuals. These brain regions included the primary somatosensory cortex, the anterior cingulate cortex, and the prefrontal cortex. All three of these brain regions have been implicated in various aspects of nociceptive/pain processing by multiple lines of experimental evidence and are well positioned to contribute to the conscious experience of pain. Given that (1) each individual used introspection to provide a psychophysical report of their subjective experience of pain intensity and that (2) the magnitude and frequency of activation in brain regions important in the processing of pain was significantly related to the magnitude of reported pain across different individuals, we conclude that introspection is a valid method for examining the subjective experience.

The act of introspection, however, is not without its limitations. An experience of pain which is being actively evaluated by an introspective process may be substantially different than an experience of pain that is not being actively assessed for subsequent reporting. Attention and distraction can powerfully modulate the experience of pain and can easily alter its quality or magnitude. However, such changes are some of the many difficult confounds that can occur during any experimental investigation of pain. Although a limitation, having third person access to even an altered first person perspective is superior to having no access to that perspective. Without the first person perspective, one is forced to examine nociception rather than pain.

#### 4. Integrating First Person Introspection with Third Person Methodologies

The major strength of the classic psychophysical approach — the emphasis on obtaining reports of a very narrowly defined dimension of a conscious experience — is also its greatest weakness. Subjects may volunteer reports of experiences beyond those being measured, but without being included in the experimental design, such reports are often disregarded. Without a first person perspective, the investigator is completely ignorant of the rich complexity of a given conscious experience and therefore is distanced from a meaningful interpretation of the underlying neural (or psychological) mechanisms.

The experiential/phenomenological approach advocated by Price and Barrell provides a method to overcome the limitations of such narrowly focused psychophysical studies (Price and Barrell 1980). This approach represents a critical formalization of a strategy that many scientists studying human pain have already employed — using first person experiences to formulate questions for a third person experimental phase. Scientists typically participate in some aspect of a preliminary study prior to recruiting (generally) naive subjects for the actual experiment. Yet, in almost all instances, this participation is relatively informal and is directed at a very limited set of practical rather than intellectual questions (i.e., Will the subjects get a burn from this stimulus? Will my stimulator work in an MRI scanner?). By formalizing the participation of the investigator(s) in a preliminary first person phase, the complexity of the conscious experiences which may have occurred during the experimental paradigm becomes accessible to the investigator(s). Subsequently in the third person phase of the study, experimental questions can be directed specifically at conscious experiences identified during the first person phase of the investigation.

The experiential/phenomenological approach provides a powerful tool, particularly when coupled with vertical paradigms where the neural correlates of differing dimensions of the subjective experience can be examined. By obtaining a more complete view of the first person perspective, the capacity to explain neural events occurring during the experiment is vastly enhanced. In our own laboratory, we have started using this strategy. Remarkably, after nearly two decades of using (and experiencing) noxious thermal stimuli, we have identified several novel experiential dimensions in first person experiments that are now being actively investigated in third person designs.

One significant consideration in using experiential/phenomenological designs is experimenter bias. If an experimenter has an expectation of a certain outcome and a desire for that outcome, the results of the first person phase of the experiment may be significantly biased. Expectations and desire may actually reshape the perceptual experience of the investigator. Subsequently, if the questions formulated for the third person phase are based on the reshaped experience of the investigator, the experiences of the subjects (or their reports of their experiences) may be substantially and similarly altered. One possible example of how such biases can occur can be seen in the thermal grill illusion. This illusion is evoked by stimulating the skin with a grill in which alternating bars are innocuously cool and innocuously warm. A complex sensation with thermal qualities is elicited. When subjects are instructed to rate the magnitude of pain evoked during such an experience, pain reports are obtained (Craig *et al.* 1996). However, when subjects are provided a broad list of verbal descriptors of thermal qualities as well as pain, the pain descriptor is rarely chosen (Fruhstorfer *et al.* 2003). Importantly, if the experiential/phenomenological paradigm is employed by investigators who are aware (or attempt to be aware) of their own potential biases, questions formulated for the

third person phase can be made sufficiently broad to capture a more accurate view of the subjective experience of naive individuals.

## 5. Conclusion

As a sensory and emotional experience, pain is uniquely private and extremely difficult to appreciate from a third person perspective. Integrating first person methodologies into the study of populations of subjects is absolutely essential for relating the complex, multiple dimensions of the experience of pain to their underlying neural mechanisms.

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## References

- Baxter D.W., and Olsezewski J. (1960). "Congenital universal insensitivity to pain," Brain 83: 381–393.
- Beecher H.K. (1959). Measurement of Subjective Responses, New York: Oxford University Press.
- Coghill R.C., McHaffie J.G., and Yen Y.F. (2003). "Neural correlates of interindividual differences in the subjective experience of pain," Proc Natl Acad Sci USA, 100: 8538–8542.
- Coghill R.C., Sang C.N., Maisog J.M., and Iadarola M.J. (1999). "Pain intensity processing within the human brain: A bilateral, distributed mechanism," J. Neurophysiol. 82: 1934–1943.
- Craig A.D., Reiman E.M., Evans A., and Bushnell M.C. (1996). "Functional imaging of an illusion of pain," Nature, 384: 258–260.
- Dejerine J., and Roussy G. (1906). "La syndrome thalamique," Rev. Neurol. 14: 521–532.
- Fruhstorfer H., Harju E.L., and Lindblom U.F. (2003). "The significance of A-delta and C fibres for the perception of synthetic heat," Eur J. Pain, 7: 63–71.
- Morgan M.M., Heinricher M.M., and Fields H.L. (1994). "Inhibition and facilitation of different nocifensor reflexes by spatially remote noxious stimuli," J. Neurophysiol. 72: 1152–1160.
- Price D.D. (1999). Psychological mechanisms of pain and analgesia, Seattle: IASP Press.
- Price D.D., and Barrell J.J. (1980). "An experiential approach with quantitative methods: a research paradigm," Journal of Humanistic Psychology, 20: 75–95.
- Sherrington C.S. (1908). The integrative action of the nervous system, London: Archibald Constable.
- Sherrington C.S. (1910). "Flexion-reflex of the limb, crossed extension-reflex and reflex stepping and standing," J. Physiol. 40: 28–121.

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## The Problem of Pain

*Eddy Nahmias*

When my wife was pregnant, our birthing coach asked the class “What is pain?” I thought I might finally get to display some of my philosophical training, but alas, the correct answer was: “Pain is whatever she says it is.” The coach’s ‘sufferer-centric’ definition echoes the one offered by the International Association for the Study of Pain (IASP) — “Pain is always subjective” — as well as the definition of pain offered by the philosopher Saul Kripke in his argument against identity theory — “Pain ... is picked out by the property of being pain itself, by its immediate phenomenological quality” (1972: 152).

These subjective conceptions of pain pose problems for the scientific study of pain, as Price and Aydede point out in the introduction of their chapter. If the essence of pain is its phenomenological quality, then it seems the only way to study it directly is through introspection and subjects’ verbal reports on their conscious experience, but this is often considered to be an unverifiable and unreliable method. Conversely, indirect information about the objective properties associated with pain experiences seems inadequate to fully explain the essential phenomenological quality of pain. The problem, which generalizes to other conscious experiences, is that any materialist theory that attempts to explain subjective experiences in terms of objective properties seems doomed to leave out the very essence of what it is trying to explain — e.g., the feeling of pain. And any non-materialist theory seems doomed to be unscientific. What I will call the “problem of pain” has us taking a materialist approach to the study of pain while conceiving of pain in a way suggestive of metaphysical dualism.<sup>1</sup>

The first step in responding to the problem of pain is to recognize the possibility of epistemological dualism. As Price and Aydede explain this idea, certain complex neural processes can be accessed in two fundamentally different ways: first, conscious agents in whom the processes occur can introspect on them, and second, other agents (often with the aid of scientific instruments) can observe the processes as well as their objective causes (e.g., stimuli) and effects (e.g., behavior).<sup>2</sup> The two types of access provide two different kinds of information, experiential and physical, about the same process. The authors do not flesh out this theory here, but they are right to point out that if sense cannot be made of the idea that one and the same physical process can be accessed in these two fundamentally different ways, then we seem stuck having to choose between some form of metaphysical dualism (perhaps epiphenomenalism) and some form of reductive materialism that eliminates conscious experiences from our ontology (i.e., our catalog of what is real and can be studied scientifically).

The second step in responding to the problem of pain is to recognize that, though pain experience is essentially subjective, there is no single and simple pain experience. As the authors discuss, people can distinguish differences between, for instance, experiences of ‘first pain’ and ‘second pain’ and between the intensity and the unpleasantness of pain experiences, and these differences correlate with specific activity in the central nervous system. Indeed, by the time a subject experiences a peripheral noxious stimulus as pain, the experience has become subject-relative in that the incoming neural signals have interacted with complex brain activity specific to the subject. This activity includes emotional and cognitive processes, such as the

subject's fears about being in pain and beliefs about the long-term effects of the pain. These subject-relative processes explain the diversity of introspective reports in response to identical stimuli, which encourages the idea that pain cannot be identified with any objective processes and that introspection is unreliable. On the contrary, however, using introspective methodologies in combination with objective observations is required to understand the complexity of pain experience and to test the reliability of introspective reports (see below).

Most pain researchers have been painfully aware of the complexity of factors involved in the subjective experience of pain and introspective reports about them. In contrast, when philosophers present the problem of pain, they often suggest that pain is a simple experience corresponding to a simple type of peripheral neural process (e.g., the C-fibers "identified" with Kripke's arguments). Paradoxically, it is only by recognizing the complexity of pain experiences that we can begin to imagine a satisfying response to the problem of pain. Any successful theory explaining how neural processes can have experiential properties will have to refer to the range of emotional and cognitive states involved in pain experiences and to the corresponding range of diverse neural states.<sup>3</sup>

Notice the vague language in the previous sentence regarding the processes and states at issue. The third step in responding to the problem of pain is to recognize how far we are from understanding how to individuate the terms on either side of the equation — both the subjective states, including emotional and cognitive states, and the corresponding neural processes. This point reminds us of William James's description of the state of psychology in 1892: "We don't even know the terms between which the elementary laws would obtain if we had them" (p. 335). So, while one way to describe the problem of pain is to point out that we have no theory to explain how neural states can be conscious states, one response is to point out that we do not yet have a theory about which neural states to pick out or how to individuate the conscious states at issue — including, for instance, how to obtain complete and accurate descriptions of pain experiences. What we do have is a lot of inductive evidence that some such correlations exist and that suggests such a theory is precisely what we should be looking for. What we need, in the meantime, is a methodology to arrive at such a theory.

It should be clear by now that I think Price and Aydede gesture towards each of these three steps in responding to the problem of pain. So, those who prefer scathing critiques may prefer to stop reading this commentary. Instead, I will continue to clarify and to extend some of the authors' most important claims, now turning specifically to their proposed methodology.

Epistemological dualism is a philosophical theory in need of empirical support. The best methodology for garnering such support — and for challenging both some versions of dualism and eliminative versions of materialism — requires using introspective reports.<sup>4</sup> The goal is to map out the "phenomenological space" of conscious experience and to map this structure onto the "neurobiological space." The latter mapping, what Price and Aydede call the "vertical phase" of their experiential approach, is a well-accepted if nascent method in cognitive psychology and neuroscience. But the idea of mapping the phenomenology of pain (and other conscious experiences), what they call the "horizontal phase" of their approach, is more controversial and under-explored.<sup>5</sup>

The most novel suggestion the authors offer is to encourage pain researchers to become subjects of their own investigations. This idea, as they point out, has been used in some prior pain research. It was also the standard methodology of the introspectionist psychologists. But unlike the introspectionists, Price and Aydede emphasize that the experimenter should passively observe their experiences rather than actively attending to particular aspects of it. This helps to

avoid introspective reports that interpret experiences in terms of one's theoretical commitments and that unduly elaborate on the experience itself (for instance, some introspectionists obtained 20-minute reports of two-second experiences). However, I do not think the authors are clear enough about what they think introspection is, and the success of their methodology may vary depending on what model of introspection it employs (see below).

The authors are also not explicit enough about why their methodology requires experimenters to test their ideas on themselves rather than others. Their four-step methodology suggests that hypothesis generation and data interpretation will be facilitated by this approach (and surely it is more practical for researchers to do pilot studies on themselves). But it should also be emphasized that introspection, considered analogously to other types of observation, is a skill that can be improved with practice and with knowledge of the basic goals of inquiry. Untrained and uninformed subjects are less likely to attend to the subtle aspects of their experiences, especially the distracting and unpleasant experience of pain. And while one of the problems with the classical introspectionist methodology was that training led to theory-laden reports, in fact untrained subjects are also inclined to offer explanations (biased by their lay theories) about why they are experiencing what they are rather than just descriptions of how things seem to them.

Experimenters using Price and Aydede's methodology can practice introspecting pains produced by the same stimuli numerous times with the aim of producing consistent and clear descriptions of those experiences that are minimally tainted by theory. They can examine the relationships between different experiences produced by numerous different stimuli.<sup>6</sup> And they can compare introspective reports, including the vocabulary used, among themselves to test for inter-rater reliability. Unlike the introspectionists, these reports are treated as neither definitive nor final data but rather as preliminary data, which can then be used to generate hypotheses to test on untrained subjects. The experimental stage involves correlating objective data in the form of untrained subjects' verbal reports with objective data about both the stimuli and the resulting neural processes. Indeed, as the authors point out, "the independent variable becomes the experiential dimension to be manipulated as opposed to the external conditions used to produce changes in the experiential dimension" (this volume, p. ??).

An interesting recent example of this is demonstrated in an experiment by Coghill, McHaffie, and Yen (2003). Previous experiments have shown consistent within-subject relationships between brain activity and subjects' pain reports as evoked by different stimuli. This experiment established between-subject correlations among different subjects' brain activity and their varying reports of pain intensity in response to the same stimuli. High-sensitivity subjects (who report a high degree of pain on a visual analog scale for pain intensity) showed more activity in anterior cingulate cortex and primary somatosensory cortex than did low-sensitivity subjects (while there were no significant differences in thalamic activity). This suggests that the experienced intensity of pain is mediated by cortical areas associated with emotional and cognitive functions.<sup>7</sup> This experiment provides evidence that subjects' introspective reports are reliable indicators of objectively measured neural activity, as predicted by epistemological dualism. It also demonstrates the second step in responding to the problem of pain discussed above — that the experience of pain (even intensity alone) will be identified with a complex, though consistent, range of neural activity rather than with some simple neural process.

The problem of pain mirrors traditional arguments for dualism. It just doesn't seem like the subjective feeling of pain can be the same thing as electro-chemical processes. But the

correlations begin to look less contingent and the identity claim less mysterious as researchers uncover more detailed and complex correlations between the phenomenal and the neural. It makes sense that C axons, which fire slowly, correspond to dull, throbbing experiences of second pain, while A axons, which fire more rapidly, correspond to sharp, stinging experiences of first pain. It makes sense that increased activity in anterior cingulate cortex, which is associated with emotions such as fear, increases the experienced intensity of pain. Using better introspective methods in combination with improved tools for measuring brain activity is the best way to move towards an explanation of how epistemological dualism works — or to show that it doesn't.

In fact, Price and Aydede suggest that their methodology works on either physicalist or dualist assumptions. They mean that it will work to map the correlations between conscious experiences and brain activity, whether considered as two dimensions of one process (e.g., type identity theory) or as two distinct things or properties connected in law-like ways (e.g., dualist epiphenomenalism). However, there are some forms of physicalism, such as anomalous monism, that suggest such law-like correlations will not be found, because there are no psychophysical laws. And there are forms of dualism — namely Cartesian interactionism — that should also predict that such correlations will not be found, because some of the emotions and thoughts affecting the experience of pain occur in an immaterial mind beyond neuroscientific study. That is, first-person reports of pain, if modulated at all by the input of a non-physical mind, should not be expected to correlate consistently with the same types of neural activity.

Indeed, I think Price and Aydede attempt to be too inclusive in their metaphysical claims. Whereas they suggest that their methodology is amenable to various types of dualism and physicalism, they should argue more explicitly that their methodology works only if certain metaphysical theories of mind are true, and conversely, that their methodology offers a way to put pressure on other metaphysical theories by discovering the correlations that those theories predict should not be found.<sup>8</sup> If we can use introspective methodologies to improve the horizontal mapping of the structure of our phenomenology and to bring to fruition the vertical mapping between phenomenology and neurobiological processes, then we will have empirical evidence suggesting type identity between the mental and the physical — especially if the vertical mapping also provides information about why the phenomenological states have the properties they have (just as in other scientific reductions where the lower-level properties explain the properties at the higher levels).

I'll conclude with a question about the authors' view of introspection. Price and Aydede (perhaps wisely) attempt to avoid an analysis of introspection, and they suggest that their methodology is amenable to various conceptions of introspection, such as the higher-order thought (HOT) model as well as the higher-order perception (HOP) model. But their methodology may work differently depending on what introspection is — and if there are different types of introspection, it may depend on what type the experimenters and subjects use.<sup>9</sup> For instance, does introspecting on a pain involve a distinct process from just consciously experiencing that pain? If the introspection is a distinct process, then we should expect to see different neural activity in subjects who are introspecting on their pain than in those who are simply experiencing pain. If the passively attentive introspection the authors advocate is a different process than the actively attentive introspection used by the introspectionists, then we should expect different neural activity and different reports from subjects who employ these different types of introspection. Perhaps we will be able to examine how the process of introspecting alters the neural activity associated with the pain experience and alters it differently

depending on the type of introspection employed. Presumably, the introspective methodology Price and Aydede outline can be adapted to study the nature of introspection itself, though I'll leave it as an exercise for the reader to consider how this might work.

## Notes

<sup>1</sup> Price and Aydede point out several ways that pain poses different problems (and solutions) than other conscious experiences. The more general problem is posed by several different arguments in the philosophical literature. Kripke's argument against identity theory, roughly, is that pain states are not identical with neural states (e.g., C-fibers firing) because, unlike other cases of discovered identities (e.g., water = H<sub>2</sub>O), we have no explanation for the apparent contingency of this purported necessary identity. The essential property of pain states, their phenomenological quality, seems like it could exist without a particular neural state (or any neural state), and the neural state seems like it could exist without the specific feeling of pain, and we have no explanation for its seeming to be this way. Kripke sees this as a problem for any type-type identity theory (though not as an argument for dualism; see p. 155).

<sup>2</sup> See their note 6 for philosophical discussions of epistemological dualism.

<sup>3</sup> The complexity and diversity of experiences such as pain may explain why some philosophers have seen token-token identity theory as a more plausible alternative than type-type identity theory. I think the plausibility of type-type identities depends on how liberal we are about the types at issue. We will not discover an identity between the type "pain experience" and any specific type of neural process (e.g., C-fibers firing). But that does not entail that there is no identity between more-fine grained types of pain experience and more fine-grained complexes of neural activity.

<sup>4</sup> The authors correctly point out that introspection (sometimes in disguised form) has been used often in experimental psychology since the demise of introspectionism. For further defense of the scientific legitimacy (and necessity) of introspective methodologies, see Goldman (1997), Jack and Shallice (2001), Vermersch (1999), Nahmias (2002) and various articles in the "Trusting the Subject" editions of the Journal of Consciousness Studies (2003 and 2004).

<sup>5</sup> In addition to the introspective methodologies the authors discuss, other recent approaches include the phenomenological interview (e.g., Pollio et al. 1997), Descriptive Experience Sampling (e.g., Hulbert and Heavey 2001), and protocol analysis (Ericsson and Simon 1993).

<sup>6</sup> Few college sophomores will have had extensive experience with a variety of different pains, but (dedicated!) pain researchers can expose themselves to a range of painful stimuli and examine the relationships between the resulting experiences (though, my wife assures me, unless they experience childbirth, they'll never understand real pain).

<sup>7</sup> It would be interesting to test the brain activity of a "stoic subject," one whose cortical activity suggests they experience a high degree of pain intensity though they report a low intensity. Presumably, they would show interesting differences from both high- and low-sensitivity subjects in other cortical areas associated with cognition and language.

<sup>8</sup> For instance, Price and Aydede claim (note 8) that nothing about their methodology crucially depends on what sort of relation holds between physical and mental states — e.g., type identity vs. supervenience. However, as they note, supervenience allows that the same type of mental state (e.g., pain states) may be realized in different types of neural states. Depending on the range of neural states at issue, some forms of supervenience may thus make their methodology ineffective. The first-person introspective reports would not pick out any neural kinds to be

studied using third-person methods. On the other hand, the success of their methodology and the case studies they discuss provides tentative support for type-identity theory (though it may be unable to rule out dualist epiphenomenalism).

<sup>9</sup> See Prinz (2004) for a discussion of the different processes that fall under the category of introspection.

## References

- Coghill, R., McHaffie, J., and Yen, Y. (2003). "Neural correlates of interindividual differences in the subjective experience of pain." *PNAS*, 100: 8538–8542.
- Ericsson, A. and Simon, H. (1993). *Protocol Analysis*, Cambridge, Massachusetts: MIT Press.
- Goldman, A. (1997). "Science, publicity, and consciousness," *Philosophy of Science*, 64: 525–545.
- Hulbert, R. and Heavey, C. (2001). "Telling what we know: describing inner experience," *Trends in Cognitive Sciences*, 5: 400–403.
- James, W. (1892/1961). *Psychology: The Briefer Course*, New York: Harper & Row.
- Kripke, S. (1972/1980). *Naming and necessity*, Cambridge: Harvard University Press.
- Jack, A.I. and Shallice, T. (2001). "Introspective physicalism as an approach to the science of consciousness," *Cognition*, 79: 161–96.
- Nahmias, E. (2002). "Verbal reports on the contents of consciousness: reconsidering introspectionist methodology," *Psyche*, 8(21).
- Pollio, H., Henley, T., and Thompson, C. (1997). *The Phenomenology of Everyday Life*, Cambridge, UK: Cambridge University Press.
- Prinz, J. (2004). "The fractionation of introspection," *Journal of Consciousness Studies*, 11(7/8): 40–57.
- Vermersch, P. (1999). "Introspection as practice," *Journal of Consciousness Studies*, 6: 17–42.