Methodological Pitfalls in the "Objective" Approach to Consciousness: Comments on Busch et al. (2009)

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One major problem in the empirical investigation of consciousness is to identify a so-called objective measure of the presence or absence of a specific conscious experience. An objective measure, in this context, refers to a measure of how well a subject is able to solve a task or to a report, given by the subject, which does not explicity refer to his or her own conscious experience. Such task performance or report may be influenced by conscious as well as unconscious processes. Subjective measures, on the other hand, are defined as reports (verbal or other kinds) made by a subject directly about his or her conscious experience. The paper by Busch, Fründ, and Herrmann (2009) is an important and interesting suggestion of how to find neural correlates involved in change detection and change blindness, but it also claims to infer knowledge about conscious experiences from its data. This commentary will focus on this last claim.

In their study, the authors present a change blindness experiment in which they investigated whether change detection (sensing) and change identification (seeing) rely on different or similar neural processes. The authors successfully identified some ERP components that were similar for both conditions (the VAN and the P3) and some other components that specifically occurred for changes that were identified (the change-related positivity and the N2pc). In a second experiment (visual search), the authors showed that the N2pc reflected selective attention, whereas the change-related positivity was specific for change identification. They conclude that sensing and seeing a change rely on different neural processes. These results are based on signal detection theory (SDT) according to which data are analyzed and interpreted.

SDT is a model of how systems detect signals among noise, and it has repeatedly proven applicable to the human perceptual system (Green & Swets, 1966). SDT provides an objective measure of a subject's capacity to detect stimuli (d') and a criterion for detection (C). Thus, the theory suggests a way to obtain data about a subject's perceptual capacity that is not based on subjective verbal reports but on "objective reports," that is, their task performance.

There is, however, an important conceptual and empirical distinction between signals and reports (Overgaard, 2009). In this terminology, different from the SDT terminology, signals refer to the "uncontrolled behaviors such as reflexes" of a subject (Overgaard, 2009, p. 16)—that is, the observation of behavior that is not as such intended to inform an observer yet may be of use as data to analyze some cognitive process. Reports, in contrast, are communications from the subject; this may be a verbal statement describing a complex scenery or something as simple as a button press when a target is present—the important part being that the subject is intending a communication using a report.

SDT makes no such demands that reports are based on intended communications or on reports directly about consciousness. Accordingly, a signal in SDT is not necessarily an expression of what a subject has perceived consciously.

In order to measure d' and C, subjects are performing a task, for example, a visual detection task. One problem that has previously been identified is that task performance is not a good guide to conscious experiences because unconscious factors might also be involved (Lau, 2008). To illustrate this point, Lau (2007) describes an experiment where the same d' is constant while reports of experience differed in subjects over time. Therefore, d' as well as C seem blind to the conscious experience the subjects has while performing the task. They seem to be of use when describing those cognitive events that make an overt behavior possible (such as responding to the presence of a target), that is, the so-called objective aspects of perception. However, Busch et al. (2009) are more ambitious than that. They claim explicitly to be investigating the subjective aspects as well using SDT—an approach that we, as argued above, find problematic as a matter of principle.

The experiments by Busch et al. (2009) do however contain two important deviations from what may be considered a "standard" SDT design. Those deviations, it

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could be argued, may better the case for the experiments' ability to give information about conscious experience. First, whenever the subjects scored a hit, they were asked to identify the changing object (reporting either the object in the first or the second display) out of eight possible objects. Second, subjects were asked not to guess about detecting a change or the identity of the changing object (but instead answer "not sure") if they were uncertain.

Busch et al. (2009) claim that a "full blown visual experience [is] required for [object] identification"—that is, in order to complete the additional task, subjects must as a matter of principle have a visual experience of the object. However, the task is simply selecting the right object out of small number of possible objects. Similar approaches have been used previously to show the exact opposite by adding a subjective scale of conscious experience: the presence of subliminal perception. Several experiments in cognitive science and, for example, the blindsight literature are classically interpreted to show that the performance of such identification tasks in the absence of reports about experience demonstrate that unconscious visual identification is possible (Overgaard & Timmermans, in press; Trevathan, Saharie, & Weiskrantz, 2007). Accordingly, we find it problematic that Busch et al. use no measure of conscious experience yet still use an exact opposite interpretation of this kind of observation without further argument.

This further argument could then theoretically be that because the subjects are asked not to guess but only to respond when they are certain, they are in fact conscious of the changing object when they make a positive identification, as high confidence ratings such as "certain" are often associated with awareness (Dienes, Altmann, Kwan, & Goode, 1995). However, drawing an exact line when to "be guessing" and when to "respond to a vague experience" may not be a simple task to the subjects who, more likely than not, will use different criteria to solve this situation. Theory aside, the argument is in fact in conflict with the actual data. The problem is that subjects are only correct around 70% of the time when trying to detect a change (chance is 50%) and 54% of the time when identifying a changing object (chance is 25%). These numbers indicate that the subjects are guessing, at least to some extent. The simple instruction not to guess, in other words, seems not to be sufficient.

In conclusion, we believe that our relatively simple arguments above support conclusions from several other recent publications (e.g., Seth, Dienes, Cleeremans, Overgaard, & Pessoa, 2008; Slagter, Lutz, Greischar, Nieuwenhuis, & Davidson, 2009) that the application of objective methods only to study conscious experience in all cases ends up in self-contradiction and methodological pitfalls.

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