

# The electrophysiology of introspection <sup>☆</sup>

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## Abstract

To study whether the distinction between introspective and non-introspective states of mind is an empirical reality or merely a conceptual distinction, we measured event-related potentials (ERPs) elicited in introspective and non-introspective instruction conditions while the observers were trying to detect the presence of a masked stimulus. The ERPs indicated measurable differences related to introspection in both preconscious and conscious processes. Our data support the hypothesis that introspective states empirically differ from non-introspective states.

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## 1. Introduction

It is sometimes claimed that introspection is the *sine qua non* for empirical consciousness research (Jack & Roepstorff, 2003; Overgaard, 2003), although other experimental methodologies to study consciousness may exist (see e.g. Gallagher & Brøsted Sørensen, submitted). By ‘introspection,’ one often refers to the direct attending to one’s own conscious state (say, how a cup is experienced), whereas ‘non-introspection’ refers to attending to a stimulus (say, a cup as an external object) (e.g. Gallagher & Brøsted Sørensen, submitted; Lyons, 1986). It is important to underline that introspective as well as non-introspective states may be conscious. Although it has been argued that the difference between introspective and non-introspective

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consciousness is merely conceptual (Dretske, 1995), a number of empirical scientists speak of introspective and non-introspective conscious states as empirically different (Jack & Shallice, 2001; Lane et al., 2000; Marcel, 1993, 2003; Lutz, Lachaux, Martinerie, & Varela, 2002; Schooler 2002). Even though there has not yet been accumulated much empirical research regarding this distinction, the few existing papers agree with the distinction.

Overgaard and Sørensen (2004) as well as Overgaard, Kauffmann, and Ramsøy (2001) have shown that there are significant differences between conditions where participants are asked to report in an introspective way (about their experiences) and conditions where they respond non-introspectively. Participants were instructed to identify a displayed figure by pointing out its shape, colour and location on three different scales. The responses of the participants were treated as being either ‘correct,’ ‘incorrect’ or ‘near correct.’ ‘Near correct’-responses matched stimulus partially correctly (e.g. when they pointed at the same colour as the one presented, but in a brighter or darker tone). It was shown that participants in the non-introspective condition had significantly more correct and incorrect responses, whereas the introspective participants most often were ‘near correct.’ In addition, participants in the introspective condition tended to be more liberal about their reports of, for example, colour, while the participants in the non-introspective condition tended to show a more conservative style and conformed to specific colour categories.

Marcel (1993) showed a dissociation between responses when using eye blinks, hand movements and verbal reports. The dissociation was shown in a blindsight patient as well as in normal participants. When the patient and the participants were instructed to introspect, they gave the most accurate reports when using eye blinks for “yes-reports,” less accurate when using hand movements, and the least accurate when using verbal reports. The blindsight patient could even reply ‘yes, I am aware of a light’ while at the same time—during the same stimulus trial—reporting ‘no’ with hand gestures. This pattern was not present when they were told to report non-introspectively. Overgaard and Sørensen (2004) expanded on this experiment and showed that a dissociation between the response modes used by Marcel (1993) was only found when instructing participants before showing a stimulus. When the order of the instruction and stimulus was reversed, no dissociation was found.

This result of Overgaard and Sørensen (2004) could be interpreted to indicate that introspection changes the participants’ behaviour only when the instruction is given prior to the stimulus so that participants can build up an expectation of how to report. When considering Marcel’s (1993) result showing a difference between modalities when an introspective instruction was given, one could hypothesise that introspection has an effect on perception rather than on retrospective memory processes.

A governing theory about consciousness and introspection argues that introspection is a ‘displaced perception’—we come to know about our own mental states by attending to external objects and not by attending to the mental states (Dretske, 1995; Searle, 1992). According to this theory, dissociations between introspection and non-introspective consciousness would result from a change in subjective response criteria when given an introspective instruction. If this is the case, it may be revealed by signal detection theory (Green & Swets, 1966) as a systematic increase in bias. Bias, according to signal detection theory, reflects the subject’s individual set or attitude to what and when to report. In the analysis, values from visual sensitivity and report bias are separated, thus giving a distinct measure of both.

Whereas the discussion about introspection seems specific and isolated from “consciousness studies,” the status of introspection has been a haunting ghost in experimental psychology. Cognitive scientists use introspection to inform their own work from the earliest steps of pilot studies to the interpretations of results where one’s own experiences may be an important guide to understand others (Jack & Roepstorff, 2002). The very choice of terminology and categorisation of mental states into “visual perception,” “auditory perception,” etc. is based, or at least supported, by the scientist’s introspective evidence. Yet, cognitive scientists have been under much influence from widespread beliefs that there are specific and very strong methodological objections against the use of introspective evidence that make introspection useless in experimental research (e.g. Nisbett & Wilson, 1977). The debate has however moved considerably on since these beliefs were the dominant views in psychology. Although it is beyond the purpose of this article to review this debate, one may consult White (1988), Ericsson and Simon (1980), Jack and Roepstorff (2002), Marcel (2003) and Overgaard and Sørensen (2004) for the most important developments.

Considering the status of introspection in experimental contexts together with findings indicating that introspective and non-introspective reports differ, we need further information about the cognitive and neural

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