Consciousness and Cognition **10,** 588–590 (2001)
doi:10.1006/ccog.2001.0527, available online at http://www.idealibrary.com on IDEAL®

Why Do Stationary Visual Transients Apparently Fail to Elicit Phenomenal Vision after Unilateral Destruction of Primary Visual Cortex?

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It is worth clarifying from the outset what Stoerig and Barth's paper is, and is not, about. Although the subject tested is the ubiquitous blindsight subject GY, it is not a paper about blindsight (that is, residual visual function in the absence of visual awareness). Rather, by exploring the finding that patients lacking V1 report experiences associated with visual stimuli presented in their scotoma under some circumstances (e.g., Riddoch, 1917; Weiskrantz et al., 1995) Stoerig and Barth attempt to determine experimentally whether different types of visual consciousness can be dissociated. Consciousness is an everyday word and has many meanings. In order to clarify the interpretation of scientific studies of consciousness a number of more precise definitions have been suggested. Block (1996, 2001) distinguishes reflexive consciousness, the phenomenal consciousness of experiences, and access consciousness of knowledge (the control of reasoning, reporting, and action), the last of which echoes to some extent James' (1890) concept of the fringe of consciousness. Both Block and James suggest that in the normal course of events these different types of consciousness occur together. They may, however, be mediated by different neural processes and hence, given the right conditions, be dissociable. As Block (2001) puts it ''it is a wide open empirical question whether phenomenality and access consciousness are aspects of a single thing.''

Blindsight, in its original sense (e.g., Weiskrantz, 1986), is an ability to use information about a visual stimulus behaviorally while having no conscious experience of that stimulus. In blindsight there is a dissociation between phenomenality and knowledge, but that knowledge is not conscious. Moving stimuli in the impaired field of cortically blind patients have, however, been known to elicit conscious experience since Riddoch (1917). At least some of Riddoch's patients described the experience elicited by these stimuli in visual terms—''They look like shadows. Sometimes I can tell if the moving things are white.''—suggesting that access and phenomenal consciousness were elicited in tandem by these stimuli. As the authors note, GY is, however, reluctant to call such experiences ''seeing.'' GY's distinction of ''awareness'' and ''seeing'' is made objectively clear from the perimetry experiment reported at the start of Stoerig and Barth's paper. On the face of it this suggests that access and phenomenal consciousness are indeed dissociable, at least in GY. Note

Commentary on Petra Stoerig and Erhardt Barth (2001). Low-level phenomenal vision despite unilateral destruction of primary visual cortex. *Consciousness and Cognition,* **10,** 573–586, doi:10.1006/ccog.2001.0526.

1053-8100/01 $35.00

that the stimuli used in these experiments were transient but stationary white dots. In their later experiments using their good field matching task, the authors demonstrate that a moving stimulus which elicits awareness when presented to GY's impaired field of vision has visual phenomenology (at least in the sense that there is a good field stimulus which is consistently better than others at resembling the experience elicited in the impaired field). In this case awareness (access consciousness) is accompanied by phenomenology.

Is it possible to reconcile these two results? One position is to assume that in the perimetry experiment GY is erroneously judging his experience of ''awareness'' and his experience of ''seeing'' as being qualitatively different from one another when, in fact, they differ only in degree, both having phenomenal content. GY has explained on a number of occasions how difficult he finds it to make verbal descriptions of his blind field experience. Perhaps by relieving him of this demand Stoerig and Barth have revealed visual phenomenology where GY verbally denied it. Alternatively, it may be the case that GY's experience of flashed dots and moving bars do indeed differ qualitatively, the dots eliciting no phenomenology. During one experiment (Kentridge et al., 1999) I asked GY whether his ''aware'' responses to transient but stationary stimuli were an indication of visual experiences. A few (previously unpublished) excerpts from GY's response illustrate just how reluctant GY is to describe these experiences as visual! ''Positive responses were not visual experiences, it's a stupid question . . . it bears no resemblance whatsoever to anything I see in my normal [field].'' So perhaps there is something phenomenal that a moving bar in his impaired field is like for GY, but there is nothing phenomenal that a single flashed dot is like. Despite considerable effort Stoerig and Barth report that they were unable to produce a good field stimulus which GY judged to resemble his experience of a stationary bar flashed on and off in his impaired field. They were not asking him to characterize his experience verbally, so difficulties or preconceptions with description of an unusual phenomenal experience did not stand in his way. Stoerig and Barth are correct that this failure does not imply that a phenomenal match is impossible; on the other hand, it is consistent with the distinction drawn between awareness and seeing in the perimetry experiment.

Stoerig and Barth find that a pair of transients (the apparent motion stimulus) provided a better match to GY's impaired field experience of motion than a continuously moving stimulus. Indeed, GY is insensitive to the direction of motion in his impaired field when transient location cues are eliminated by using second-order motion stimuli (Azzopardi & Cowey, 2001). These findings suggest that the motion onset and offset transients rather than the motion per se may have driven GY's response. Why might an apparent motion stimulus, which is just a pair of transients, elicit phenomenal awareness, when stationary transients do not? The distribution of neural responses to moving and stationary stimuli differ, even if those stimuli have identical spatial and temporal frequency content (see, e.g., the comparison of responses to motion and counterphase flicker in Singh et al. (2000)). One speculation (and it is very much a speculation) might be that the induction of apparent motion by a pair of spatially and temporally distinct transients is to some extent a matter of construction rather than being wholly stimulus driven. In the conclusion to their study of brain activation in response to apparent motion and motion imagery Goebel et al. (1998) note that

in addition to MT/V5 activation, ''small areas of dorsolateral prefrontal cortex including BA 9/46 were strongly activated during motion imagery and to a lesser extent during objective motion.'' Dorsolateral prefrontal cortex has, of course, often been implicated in studies of the neural correlates of consciousness, including studies of awareness in GY (e.g., Sahraie et al., 1997).

Stoerig and Barth have conducted an intriguing investigation into the phenomenology of the V1-less world. I strongly recommend the reader to visit their web site in order to experience what this may be like (even if it is impossible to achieve a fully accurate recreation of this experience, given the damage and possible neural reorganization that has affected GY's visual system). I am not, however, convinced that they can justify their final conclusion that GY's awareness is never an example of conscious access in the absence of any kind of ''feel.''

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Published online October 12, 2001