Complete characterisation of residual perception in the blind field of hemianopic patients

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Résumé

Blindsight is defined as the residual visual discriminatory capacities in the blind field of patients having suffered a lesion of the primary visual cortex. Patients with blindsight are indeed capable of discriminating above chance-level between visual stimuli presented in their blind field in 2-alternative forced-choice designs. These pure objective visual capacities in the blind field can be accompanied by some forms of awareness, different from normal visual consciousness. More recently, it has been described that some patients show evidence of only this residual awareness, without the objective capacities, a phenomenon referred to as blindsense. These dissociations between visual perception and consciousness offer the opportunity to shed light on the neural correlates of visual consciousness and isolate the purely non-conscious perceptual processing. Nonetheless, the neural correlates of blindsight and its derivatives are not yet understood. Blindsight is argued to either be the result of unconscious processing relying on subcortical visual pathways or of degraded conscious vision. It is crucial for the study of blindsight phenomena that the objective and subjective residual capacities are assessed in the most rigorous and sensitive manner. With this in mind, we present here the newly developed protocol for a complete characterisation of the perceptual profile in the blind field of hemianopic patients. Participants undertake a motion detection and a motion direction discrimination task, with a response modality probing simultaneously objective and subjective responses, whilst neural activity is recorded by electroencephalography. The first-order, objective response allows to calculate classical signal detection theory sensitivity whilst the second-order, subjective component assesses visual metacognition and allows to compute gold-standard meta-*d'*. Prompting for confidence rather than visual awareness allows to circumvent the fact that the subjective component of residual processing in the blind field of hemianopic patients is rarely reported by patients as visual in nature but rather as an amodal sensation. Moreover, evaluating metacognition in hemianopic patients with and without blindsight allows to explore the hypothesis that blindsight results from a disrupted perceptual metacognitive system. We discuss the expected behavioural and neurophysiological profiles and their implications in the understanding of blindsight and its related phenomena, of visual consciousness and of neuro-rehabilitative techniques.

Mots-Clés: Blindsight, Consciousness, Perceptual Metacognition

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