Cortical evidence accumulation for perceptual experience occurs irrespective of reports

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Résumé

Perceptual experience is a multi-faceted, dynamical process, tackled empirically through measures of stimulus detectability and confidence ratings. We asked if stimulus detection and confidence can be explained by evidence accumulation, a form of sequential sampling of sensory evidence performed by the brain. We recorded stereotactic electroencephalography in 28 participants with epilepsy while they performed three face detection experiments, and analyzed high gamma activity from 3214 channels. Participants first performed an immediate-detection experiment, providing reaction times that were used to identify functional markers of evidence accumulation. We found that individual channels and a multivariate perceptual decision signal in the ventral visual and inferior frontal cortices displayed these markers. To assess conscious perception without motor or decisional confounds, participants performed two further experiments where they either provided a delayed report or viewed stimuli passively. The perceptual decision signal that was found to reflect evidence accumulation in the ventral visual cortex further differentiated between seen/unseen stimuli for delayed detection, and between high/low intensity stimuli during passive viewing. Using the same signal, we decoded confidence, a proxy of perceptual monitoring. Finally, a computational model of evidence accumulation successfully reproduced both behavioral and neural data. Overall, these results indicate that the same neural code in the ventral visual cortex was sensitive to (1) evidence accumulation, (2) conscious access irrespective of reports and (3) confidence judgments. We discuss the results in light of a proposal that a unified mechanism based on evidence accumulation can explain perceptual experience, encompassing both perceptual consciousness and perceptual monitoring.

Mots-Clés: intracranial EEG, evidence accumulation, perceptual consciousness, conscious access, perceptual monitoring

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