

Neural correlates of conscious perception in the primate brain

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The biological basis of consciousness is one of the most mysterious problems in science. Herein, investigating conscious visual perception has been postulated as amenable to a neuroscientific approach. Multistable visual phenomena, wherein unchanging sensory input elicits perceptual fluctuations in an observer, have been instrumental within this domain. Neurophysiologists have probed single neurons across the visual system in primates during such paradigms to elucidate if neural activity is correlated with subjective experience or the invariant retinal input. The first part of this talk will introduce this approach and the insights it has provided about the neural correlates of conscious vision.

The second part of the talk shall focus on a central debate in the field of consciousness research, namely the role of the prefrontal cortex. Given this region's involvement in a variety of cognitive operations, it has been suggested that the activity observed in the prefrontal cortex during paradigms of conscious perception may reflect task-related or post-perceptual cognitive processes such as decision-making, task monitoring or motor action associated with reporting the contents of perception. By investigating this region in non-human primates during no-report paradigms of conscious perception, our experiments revealed that prefrontal activity robustly reflects changes in conscious perception and conscious contents can be decoded from the activity of prefrontal ensembles. These results, together with previous work, suggest that correlates of conscious visual perception are distributed in different regions in the cortical visual hierarchy.