

Resolving perceptual ambiguity - a decision-making process?

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During sustained presentation of an ambiguous stimulus, an individual's perception will switch between the different alternatives. In behavior, the locus coeruleus (LC) – the brainstem nucleus responsible for releasing noradrenaline (NA) throughout the cortex - plays a crucial role in consolidating the selection of a response and ensuring continual reassessment of available options. We hypothesized that the LC-NA system plays a similar role in selecting between perceptual alternatives. Since pupil dilation under constant illumination reflects LC activation, we recorded pupil diameter, while observers viewed 4 different rivalry stimuli (3 visual, 1 auditory). For all stimuli, pupil dilation was seen prior to the report of a perceptual transition. The relative dilation 600ms prior to the transition correlated with the subsequent duration of perceptual stability. These effects could not be explained by eye movements or blinks, the motor response or by stimulus-driven changes in retinal input. We interpret this robust link between pupil dilation and perceptual switches as evidence that the LC-NA complex plays the same role in perception as in behavioral selection. In this view, perceptual transitions in multi-stable perception may reflect a form “perceptual decision-making”.