

## Pupil dilation does not predict subsequent stability in perceptual rivalry

What is the cause of perceptual switching of ambiguous stimuli? Although local competition between stimulus-specific representations can explain bistable perception dynamics (1), Einhäuser *et al.* (2) argue that norepinephrine (NE) release in the locus coeruleus (a nonperceptual structure) could play a critical role in perceptual bistability. They reported an NE-mediated increase in pupil diameter coinciding with perceptual switching. Remarkably, the relative amount of dilation before switching was a weak but significant predictor of the duration of the subsequent percept. We questioned these results in two independent experiments on bistable perception (3, 4). Using Einhäuser *et al.*'s method (2), we replicated both results. However, we contest that the positive correlation between pupil dilation and relative percept duration is predictive, because both measures are not independent of each other: For percepts shorter than 3 s (in our dataset, median = 1,840 ms, and  $n = 940$ ), switch-related pupil dilation can last until the next switch. Meanwhile, given the overall distribution of percept durations, we observed that the next percept lasted longer (median = 4,095 ms, and  $t = -30$ ). We

verified that removing these short percepts completely abolished the positive correlation. We conclude that this correlation, which is not reliable across subjects, is most likely an artifact. However, pupil response around perceptual switching is intriguing. We conducted a series of experiments to dissect the perceptual and motor components of this response, and we observed a large influence of the motor command (3), contrary to the suggestion made by Einhäuser *et al.* (2).

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