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Perceptual switch creates a transient bias in favor of the new state at neighboring locations. Stimulus ambiguity does not matter.

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Abstract

When several multistable objects are presented simultaneously, they tend to be in the same perceptual state, the effect called “perceptual coupling”. Here, we demonstrate that it is a change in perception that broadcasts a transient bias in favor of the new state to nearby objects. To this end, we presented two ambiguously rotating spheres asynchronously, so that the onset of the second (probe) sphere was systematically varied relative to an induced perceptual switch in the first (prime) sphere (SOA -300..+400 ms). A perceptual switch was induced by reversing the on-screen motion. At the time of the switch, the prime sphere was either fully ambiguous (bistable) or disambiguated using stereoscopic depth cues. We found that the influence of the prime on the probe was the strongest when the probe appeared approximately 50-100 ms after the on-screen motion reversal. We modeled the interaction via a hierarchical Bayesian regression by assuming that probe sensitivity to the bias and the strength of the bias, which was induced by the prime, both decay exponentially. The former decayed with a rate of approximately 1/100 ms, whereas the latter had a slower decay rate of 1/220 ms (for disambiguated prime) and 1/270 ms (for bistable prime). To summarize, a change in a perceptual state of an object elicited a short-lived bias in favor of the new perceptual state, which was broadcasted to the neighboring objects. This indicates that a perceptual switch is a non-local event that also affects spatially

adjacent neural representations. Importantly, this bias was produced by both bistable and disambiguated objects. This points towards general mechanisms of visual perception, which are common to both exogenously and endogenously induced changes in perception. Finally, the switch-time transient nature of new-state bias propagation matches well-known neural correlate of perceptual switches in the frontoparietal network.