

## **EEG signatures of perceptual reversals of bistable visual and linguistic stimuli**

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The brain is constantly faced with ambiguous information, both in sensory and linguistic domains, and its ability to effortlessly interpret these ambiguities is one of its most impressive features. The study of ambiguous visual stimuli has provided a wealth of knowledge about how the visual system creates coherent representations of the world from inherently noisy and overwhelmingly dense sensory inputs. The Reversal Negativity (RN) is an event-related potential (ERP) elicited when one's subjective perception of a bistable ambiguous figure, such as the Necker Cube or Rat-Man drawing, switches from one of its possible interpretations to the other. The RN is thought to reflect a change in the perceptual configuration of a stimulus' current representation in the brain, and has been observed in response to other forms of perceptual switching, such as binocular rivalry, as well as in the auditory modality. The current study investigates whether ambiguous sentences having two valid interpretations (e.g. "The chicken is ready to eat") are represented in a similar bistable fashion as these ambiguous figures and whether a similar reversal signature is present when one's interpretation of these sentences switches.

To investigate this question, we recorded brain activity from 24 participants using EEG while presenting them with ambiguous figures followed by disambiguated variants, and ambiguous sentences followed by line drawings depicting one of the sentence's two possible meanings. The ambiguous figures consisted of Schroeder's Staircase, a Necker lattice, and the Rat-Man, along with their disambiguated variants. The sentences consisted of "The chicken is ready to eat," "I saw her duck," and "She hit the man with the umbrella," with corresponding drawings depicting each possible interpretation of these sentences. On each trial, participants indicated whether or not the disambiguating stimulus matched their subjective interpretation of the previously seen ambiguous figure or sentence. We then compared ERPs elicited by these disambiguating stimuli in mismatching (reversal) reports vs. matching (stable) reports. Replicating previous findings, we observed the typical RN associated with reversals of the bistable visual figures. In response to reversals of our "bistable" ambiguous sentences, we identified a large, frontally-distributed negativity effect occurring over a similar time-course as the visual RN. We interpret this finding as evidence that the brain may engage in similar types of processing and perceptual switching across different types of bistable ambiguities, in this case for more abstract "conceptual" ambiguities such as those present when forming representations of sentences.