Binocular rivalry

- Effects of interocular grouping demands on binocular rivalry
- Distinct dorsal and ventral streams for binocular rivalry dominance and suppression revealed by magnetoencephalography
- Intracranial Recordings Reveal Unique Shape and Timing of Responses in Human Visual Cortex during Illusory Visual Events
- Probing the mechanisms of probe-mediated binocular rivalry
- Tagged MEG measures binocular rivalry in a cortical network that predicts alternation rate
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- Intracranial Recordings of Occipital Cortex Responses to Illusory Visual Events
- Inter-hemispheric wave propagation failures in traumatic brain injury are indicative of callosal damage

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Binocular rivalry is a phenomenon in vision science and psychology that occurs when conflicting visual information is presented to the two eyes simultaneously. When different images or patterns are presented to each eye, the brain cannot fuse these conflicting inputs into a single coherent percept. Instead, it alternates between perceiving the image presented to one eye and the image presented to the other eye, causing a perceptual rivalry.

Key features of binocular rivalry include:

Perceptual Alternations: During binocular rivalry, the observer experiences perceptual alternations between the images presented to each eye. The dominant image is perceived for a period, followed by a switch to the other image.

Unpredictable Switching: The timing and duration of the perceptual switches in binocular rivalry are generally unpredictable and can vary widely between individuals and trials. This unpredictability is a hallmark of the phenomenon.

Suppression: When one image dominates perception, the other image is effectively suppressed from conscious awareness. The suppressed image is not visible to the observer during that phase of rivalry.

Interocular Inhibition: Binocular rivalry is believed to involve inhibitory processes in the visual cortex, where neurons representing one image inhibit the activity of neurons representing the other image.

Attention and Awareness: Factors such as attention, visual salience, and the complexity of the stimuli can influence the dynamics of binocular rivalry. Some stimuli may promote longer periods of dominance, while others may lead to quicker switches.

Binocular rivalry has been widely studied as a tool for investigating various aspects of visual perception and neural processing. It is used in research to gain insights into the mechanisms of visual perception, attention, and consciousness. Additionally, it has been used to study the functions of different brain regions involved in vision and to explore conditions where binocular rivalry may be altered, such as in certain neurological and psychiatric disorders.

Binocular rivalry is not limited to simple patterns and can occur with more complex visual stimuli, including images of faces, words, or scenes. It provides a unique opportunity to explore how the brain

processes and integrates visual information from the two eyes and how it resolves conflicting input.

Understanding binocular rivalry helps researchers and scientists better understand the mechanisms of visual perception and contributes to our broader understanding of how the brain processes and integrates sensory information.

The objective of the study was to determine if increasing grouping demand in the context of BR changes the perceptual experience of rivalry. In 48 subjects with normal vision, mean dominant and mixed percept durations were recorded for classic BR and IOG conditions with increasing grouping demands from two, four, and six patches.

Mokri et al. found that, as grouping demands increased, the duration of mixed periods increased. Indeed, durations of dominant and mixed percepts, as well as the percentage of time spent in a dominant or mixed state, differed significantly across conditions. However, durations of global dominant percepts remained relatively stable and saturated at about 1.5 seconds, despite the exponential increase in possible mixed combinations. Evidence shows that this saturation followed a nonlinear trend. The data also indicate that grouping across the vertical meridian is slightly more stable than for the horizontal meridian. Finally, individual differences in the speed of alternation identified during BR were maintained in all interocular grouping conditions. These results provide new information about binocular visual spatial integration and will be useful for future studies of the underlying neural substrates and models of binocular vision [1)]

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Mokri E, da Silva Castanheira J, Laldin S, Landry M, Mendola JD. Effects of interocular grouping demands on binocular rivalry. J Vis. 2023 Sep 1;23(10):15. doi: 10.1167/jov.23.10.15. PMID: 37733337.