

Bistable perception's oscillations dynamics, individual differences and cognitive flexibility: a behavioral study.

Chiara Saracini

¹ Centro de Investigación en Estudios Avanzados del Maule (CIEAM) de la Vicerrectoría de Investigación y Postgrado (VRIP) de la Universidad Católica del Maule (Talca, Chile), csaracini@ucm.cl

¹ The Neuropsychology and Cognitive Neuroscience Research Center (Centro de Investigación en Neuropsicología y Neurociencias Cognitivas, CINPSI Neurocog), Universidad Católica del Maule (Talca, Chile).

Abstract

Perceptual oscillations between different interpretations of unchanging, ambiguous stimuli have been studied for decades, being this special phenomenon considered a key towards the understanding of perceptual awareness and, ultimately, consciousness. The finding that brain dynamics (as registered, for example, through magneto- and electro-encephalography; M/EEG) of the spontaneous alternations between the percepts reflect the intrinsic dynamic properties of the (unconscious) perceptual processing has brought to many theoretical scenarios which consider perception as an inference process, and all other subserving cognitive processes working in a coordinated and coherent way. Amongst cognitive processes, cognitive flexibility is the one sharing most characteristics with the perceptual alternations, typical of bistable phenomena, being the ability to change a rule or accordingly inhibit certain information different between individuals; this "switching" ability has been shown to be correlated with the general "functioning" of a person (in turn, being this reflected by the individual neural system organization and dynamics). A preliminar, behavioral study (N=26) has been performed to provide evidence that all these aspects are, indeed, correlated. Performances in computerized classic experimental paradigms (Stroop, Simon Task, Task-switching Tests, Wisconsin Card Sorting Test) have been correlated to perceptual switches and percept durations of spontaneous and voluntary alternations of the Necker Cube and with scores in Cognitive Flexibility, Barrat's Impulsiveness, DASS-21 and the short version of Big Five questionnaires. Future studies with EEG and brain connectivity measures are going to provide a more direct insight on the brain dynamics of these perceptual and cognitive processing, shedding light on the mechanisms at the basis of this supposed, concerted coherent synchronization.

Keywords

bistable perception; perceptual awareness; cognitive flexibility; individual differences