

Binocular rivalry described by SDT derived parameters

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Abstract

Binocular rivalry has the effect of a surgical incision, through which we can explore how visual conscious experience occurs (Alais et al., 2005; Blake, 2001; Blake, Logothetis, 2002; Breese, 1909;). In this study, we examine how sensory and cognitive processes are related to parameters derived from binocular rivalry. Thus, we try to best understand what cause alternations between the two rival images (Levelt, 1966.; Logothetis, et al., 1996). We designed an experiment with two intertwined tasks: 1) a binocular rivalry task (BR), using vertical and horizontal square-wave gratings; and 2) a discrimination task related with judgments about verticality or horizontality predominance (VHPJ). In the latter, two different ways of combining vertical and horizontal gratings (blend and patches) were used as stimuli and presented briefly (Carter & Cavanagh, 2007). Statistical analysis based on the discriminability (d') achieved in the VHPJ task, according to the 'type of stimulus' (blend vs. patches), revealed significant effects of 'alternation rate', 'duration of predominance', 'time at the onset of rivalry', and 'duration of interdominance transitions'. However, the statistical analysis based on the criterion of response (C-SDT parameter) showed significant differences in both the 'duration of predominance' and the 'interdominance periods'. Our results suggest that discriminability (sensory processes) are involved in processes that activate the dominant representation; while decision rules (cognitive processes) are involved in processes of suppression. Therefore, in the same line of Kornmeier et al. (2009), these data provide evidence for a hybrid model including both forms of competition, which occur at multiple stages through the visual pathways in the brain (see Tong, 2001).

Keywords: binocular rivalry, perceptual switch, alternation rate, visual psychophysics, visual awareness.

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