

What drives the first dominance phase in binocular rivalry?

M. Blanco¹, F. Valle-Inclán², J. Corral³, I. Serrano-Pedraza⁴

¹ Departamento de Psicología, Universidad de Santiago de Compostela, Spain

² Departamento de Psicología, Universidad de La Coruña, Spain

³ Departamento de Psicología, Universidad de La Laguna, Tenerife, Spain

⁴ Institute of Neuroscience, Newcastle University, Newcastle upon Tyne, United Kingdom

When the stimuli presented to each eye cannot be fused, awareness alternates between the two monocular images. This perceptual alternation is generally assumed to involve interocular suppression and adaptation, but little is known about how one image initially overcomes the other. Plausible explanations are: asymmetric interocular suppression, interocular differences in adaptation rate, or a random process. The former two imply a clear perceptual bias favoring the selection of one eye's input, while no differences would appear if the later explanation is correct. Individual biases in onset rivalry were evident in 6 out of 8 observers tested, and they have also been reported previously (Carter & Cavanagh, PLoS ONE 2(4), 2007). What is the explanation for these biases? We obtained the monocular contrast sensitivity for each participant, and there were no differences between the eyes. Then we assessed the contrast sensitivities when there was a mask in the other eye with contrast 30% higher than the base line threshold. The results show that thresholds increased in a differential manner for each eye. These interocular differences in masked thresholds were negatively correlated with the proportion of times participants selected one or the other eye (i.e., lower thresholds during dichoptic masking increased the probability of selecting that eye). These findings suggest that dichoptic masking and the processes responsible for initiating rivalry are mediated by the same mechanisms. Since dichoptic masking involves interocular suppression in V1 (Sengpiel & Vorobyov, Journal of Neuroscience, 25(27), 2005), our results suggest that reciprocal inhibition in the primary visual area determines the onset of binocular rivalry, and that these inhibitory connections are biased.

(financed by SEJ2007-61039/PSIC)