

Sources of long-term speeding in binocular rivalry

Marcia Grabowecky

Department of Psychology and Institute for Neuroscience, Northwestern University



Satoru Suzuki

Department of Psychology and Institute for Neuroscience, Northwestern University

Abstract

We previously demonstrated long-term speeding of binocular rivalry (VSS 2004). We further investigated how the rate of perceptual alternations changed with both short- and long-term experience. During each 20 s trial, Os reported perceptual alternations between "+" and "x" shapes. When Os viewed the rivalry stimuli for the first time, alternations were slow, but they rapidly speeded, stabilizing after only 3-5 trials. Following this rapid initial speeding, alternation rates remained stable (at least across 40 trials) within a day, but gradually speeded across days, reaching an asymptote in 15-30 days. The initial rapid speeding transferred across visual hemifields, but was asymmetric; initial experience in the RVF produced slower asymptotic alternations in the LVF. In contrast, the long-term speeding was specific in position, orientation, luminance polarity, and eye of origin. To begin to identify the source of this speeding, we presented Os with subsets of the rivalry experience. To determine whether experience of rivalry is critical, we had Os experience pattern alternations (e.g., + in the left eye alternating with x in the right eye) which simulated the dynamics of actual rivalry. For long-term speeding, actual and simulated rivalry produced similarly stimulus-specific speeding, suggesting that the speeding was due to modifications of post-rivalry processes. Interestingly, the initial speeding appears to require experience of rivalry. Additional experiments determined contributions of experiencing: (1) transitions without speeding, (2) binocular stimulus transitions, or (3) stimuli without transitions. Overall, these results suggest that the rate of binocular rivalry is determined by at least two separate processes, (1) processing that resolves binocular conflict that is fast adapting, stimulus general, and hemisphere asymmetric, and (2) post-rivalry pattern processing which is slow adapting (potentially sleep dependent), stimulus specific, and hemisphere symmetric.

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