

Does audible sound modulate the potency of visual motion when that motion is suppressed from awareness by continuous flash suppression?

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Audible sounds naturally associated with specific visual stimuli can potentiate awareness of those stimuli during binocular rivalry (Chen et al., 2011; Lee, M., et al., 2015), implying formation of semantically congruent multisensory associations outside of awareness. Is awareness required for establishment of multisensory congruence between low-level sensory information? We have utilized the translational motion aftereffect (MAE) putatively mediated by direction-selective neurons and known to be attenuated by interocular suppression (Blake et al., 2006). MAEs were generated by 8-sec presentations of a pair of monocularly viewed, vertical gabor patterns comprising separate parts above and below central fixation. One pattern moved either leftward or rightward and the other remained stationary. For the visible adaptation condition, MAE contrast dependence was measured over a 1.5-log unit range, allowing selection of a non-saturated contrast for the main experiment. For the invisible adaptation condition, both gabor patterns were reliably rendered invisible by interocular continuous flash suppression (CFS; Tsuchiya & Koch, 2005). Leftward or rightward moving sound was mimicked by varying interaural intensity differences in white noise presented over headphones. Audiovisual motion could be either congruent or incongruent in direction, but owing to the potency of CFS participants were unaware of the congruence and of the location of moving gabor pattern. Following adaptation period, participants reported the duration, location (top vs bottom) and direction (leftward vs rightward) of the MAE experienced while viewing stationary gabor patterns. Among the five participants exhibiting clear dependence of MAE on gabor contrast, all showed reduced MAE duration when adaptation motion was suppressed by CFS. Of relevance to our question, MAE duration in the congruent condition was longer than in the incongruent condition, and no MAE was experienced on 26% of incongruent trials but only 15% of congruent trials. These results suggest that the low-level multisensory representations can be formed outside awareness.

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