Audiovisual congruence of adapting stimuli facilitates visual motion aftereffect

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Adaptation to physical motion in a certain direction induces motion aftereffect (MAE), illusory motion perception in the opposite direction (Tootell et al., 1995). Previous studies have shown the MAE transferred between sensory modalities: between vision and audition (Jain et al., 2008) or between vision and touch (Konkle et al., 2009). However, it has not been addressed whether integration of bisensory motion information influences the strength of resulting MAE. In the current study, we investigated whether visual MAE is modulated by the direction congruence of audiovisual motion during adaptation. Random-dot kinematogram (RDK) in which a portion of dots moving leftward or rightward was presented 6 degrees below fixation. The circular aperture of RDK subtended 0.85 degrees and the dot density was 10 dots/arcmin. Auditory stimulus was created by simulating inter-aural time difference so that it was perceived as moving leftward or rightward. There were three conditions according to the audiovisual motion congruence: congruent, incongruent, and no-sound. During the initial adaptation phase, seven participants viewed RDK in a given direction for 45s. The motion coherence of RDK alternated between individual motion detection threshold and its multifold increase for every other second. Sound was accompanied while the motion coherence was higher. During the test phase, a series of 500-ms RDKs in the direction opposite to the visual MAE was presented using an adaptive staircase procedure, which allowed us to measure motion coherence required to nullify the MAE. A 10-s top-up adaptation was interleaved with each test trial. Results showed that the motion coherence nullifying the MAE was elevated in the congruent compared to the incongruent or no-sound conditions. This was not due to the difference of gaze stability across conditions. The current findings suggest that the bisensory integration based on the audiovisual motion congruence during adaptation enhances the strength of the visual MAE.

Supported by NRF-2016R1A2B4011267