Motion-sensitive area MT+ reflects learning of implied motion in abstract paintings

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Abstract

Background: A work in our group showed that the neural machinery ordinarily engaged during perception of real visual motion is activated when people view paintings explicitly designed to convey a sense of visual motion (Kim& Blake, 2007). The involvement of the motion sensitive area MT+, however, was specific to people who have prior experience with those paintings. In the present study using fMRI, we investigated whether MT+ shows functional plasticity following learning of implied motion in abstract paintings. Methods: Fourteen observers with little interest in art participated in the study, which consisted of 3 stages including 1) pre-learning scanning, 2) learning, and 3) post-learning scanning. The pre-learning scanning was composed of two MT+ localizer runs and six rapid event-related runs. In each event-related run, nine types of events (four paintings intended to portray motion (MP), four "static" paintings (SP), and a fixation baseline) were repeated nine times and presented in a pseudo-randomized order. During learning stage after a week from pre-learning scanning, observers were given information about 2 MP and 2 SP, randomly selected from 4 MP and 4 SP presented during the pre-learning scanning. The post- learning scanning was identical to the pre-learning scanning. Results: Bilateral MT+ regions were identified successfully in all fourteen observers. In pre-learning results, MT+ responses to MP and to SP were not different statistically. In contrast, post-learning results showed that MT+ activation was greater in response to MP relative to SP. The change of MT+ responses to the two types of paintings before and after learning was not confined to those "learned" paintings but extended to those "not learned" paintings. Conclusion: The neural machinery ordinarily engaged during perception of real visual motion reflects learning of implied motion in abstract paintings intended by artists.

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