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The effect of stimulus shape on orientation discrimination of windmill pattern

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Instructions

The motion aftereffect (MAE) is a powerful of motion in the visual image caused by prior exposure to motion in the opposite direction (Anstis et al, 1998). The study with use of MAE provides information of motion direction property.

This study was conducted to investigate an effect that shape information of stimulus affects orientation discrimination of windmill pattern with use of MAE. In according to the prior study of visual pathway, shape information of objects is processed to separates from motion information (Lenny, Trevarthen, 1990). Recently, however, there were reports on the interaction between two visual pathways. Kim (2001) proposed that the interaction chromatic and luminance modulation. Nisida (2001) proposed that our brain may process different sensory modalities and attributes in an integrative fashion on the unified spatiotemporal coordinates.

Experiment 1: the effect of stimulus property

In the first experiment, we investigated the effect of stimulus shape in case of adapted stimulus is same with test stimulus, by measuring the orientation discrimination of MAE on windmill pattern. We measured the perceived orientation on test stimulus and the duration time of MAE in different shapes of stimulus.

Stimulus and Method

There were two stimuli in experimental 1. One stimulus was a shape of circle and the other stimulus was a shape of ring.

An adapted stimulus was same with test stimulus. An adapted stimulus was presented on monitor during 15sec. And then test stimulus was presented. Observers experience the MAE. They pressed space bar on keyboard when MAE finished. It was measuring the duration time of MAE. After duration time was measured, observers reported the perceived orientation discrimination. Four observers, native to the purpose of the study and with normal or corrected-to-normal vision were participated.

Results

All observers reported that the orientation of MAE by the shape of circle was different with the orientation of MAE by

the shape of ring. The orientation discrimination of MAE by the shape of circle was higher than the shape of ring, which was significant ($F(1,3) = 53.53, p < .005$). However MAE duration difference was not significant ($F(1,3) = .422, p < .562$). The results suggest that motion information is affected by shape property of object.

Experiment 2: the effect of adapted stimulus

In the second experiment, we investigated only the effect of adapted stimulus in case of an adapted stimulus was different with a test stimulus. We measured the perceived orientation on test stimulus and the duration time of MAE for different shapes of adapted stimulus.

Stimulus and Method

There were three stimuli in experimental 2. An adapted stimulus was circle or a ring and a test stimulus was adding shape. A test stimulus was same each condition. A procedure was same experiment 1.

Results

All observers reported that the orientation discrimination of circle shape MAE was higher than ring shape MAE, which was significant that the difference of orientation discrimination ($F(1,3) = 11.457, p < .043$). But it was not difference for duration time within each observer. The results suggest that the shape of object affect the motion information. And it implies to attribute integration.

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