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PERCEPTION

# **Event-Related Brain Potentials Are Correlated** With Perception of Visual Motion Sweeps

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## Introduction

The apparent motion of a 180-degree phase shift of a sinusoidal luminance grating is directionally ambiguous. When preceded by a 90-degree directionally unambiguous motion sweep, the ambiguous sweep appears to move in the same direction as the unambiguous sweep. This phenomenon is called motion priming (1, 2). Our previous studies have revealed that the P3 component of the event-related potentials (ERP) is correlated with the strength of motion priming for two directional motion sweeps (3, 4). To investigate the neural basis of perception of successive motion sweeps, we recorded ERPs during directional judgment of two or three successive moving sweeps with different combinations of directionally ambiguous or unambiguous sweeps.

### Methods

ERPs were recorded from 12 young adults (mean age = 23) participants with normal vision from 14 posterior scalp sites. Subjects reported the direction of motion by pressing the appropriate button. During Experiment 1 recording, subjects judged the motion direction (either leftward or rightward) of two successive motion sweeps (ISI = 200 ms). In Experiment 2, subjects judged the apparent motion direction of three motion sweeps. The three conditions were counter-balanced and presented in random order. The three successive motions steps could be all in the same direction (Condition A). In the other two conditions, two unambiguous jumps in either the same (Condition B) or opposite directions (Condition C) were followed by an ambiguous motion jump. ERPs were analyzed for the last motion step.

# Results

The results of Experiment 1 revealed that the early P1 ERP component to be most positive during motion priming. The P3 component was largest when two unambiguous motion sweeps were perceived in the same direction. Motion sweeps in opposite

directions elicited the smallest positive P1 and P3 amplitudes of all conditions. These effects were strongest in posterior temporal and occipital scalp areas. In Experiment 2, the P1 (peak latency about 120 ms) and P3 (peak latency about 400 ms) ERP components were found to be elicited by viewing three motion sweeps. The largest P1 and P3 were found in the condition that an ambiguous motion was preceded by motion sweeps in opposite directions. Compared to seeing motion sweeps all in the same direction unambiguously, the P3 component was smaller for ambiguous motion sweeps



ERP for perception of motion sweeps

preceded by two motion sweeps unambiguously moving in the same direction.

#### Conclusions

Our current results show that visual perception of directional motion signals has an influence on amplitude and latency of evoked potentials. The measured ERPs may reflect how motion signals are integrated temporally over responses of groups of neurons. This temporal modulation of both early visual cortical and later neural responses is important in perceptual judgment of directional motion signals.

### References

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