Illusory reverse-motion caused by converging moving objects

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In recent works (included a companion presentation to this conference) we proposed the existence of a facilitation wave that could be on the basis of motion perception. A mechanism of pre-activation of neighboring areas of the cortex by a moving object seems to be a good candidate to explain our main result: the time needed to detect a target is diminished when its presentation is preceded, in a certain spatio-temporal window, by a moving object that would converge to the same spot.

Based on this finding we designed a specific stimulus configuration that induces a powerful motion illusion: we perceive apparent motion from 2 simultaneous targets (Gaussian patches) when one of them is preceded by a primer motion. This is probably due to a facilitation wave that is consistent with neurophysiology data concerning long-range horizontal connections, supporting the influence of these connections on motion perception.

We explore more deeply this effect by asking subjects to indicate the perceived direction of apparent motion of two targets while the time between them was varied systematically according to the constant stimuli method. Targets are always preceded by moving Gabor patches. One of them arrive just near the location where one of the targets would appear (primer) and the other moving Gabor patch stops further away from the second target.

Results show that the advance in time that the primer provokes to the perceptual appearance of the target is in the order of 40 milliseconds. This is probably due to the fact that the primer facilitates the spot where the target would appear. Thus, if the primer affects the first target the direction of apparent motion is more clearly perceived; but if the primer affects the second target the apparent motion is perceived in the reverse direction.

This illusory reverse-motion supports the hypothesis that there is a further facilitation wave leading any moving object and permits also make some predictions about the perceived durations of targets affected by motion. We expect to present here also some preliminary data about predicted overestimation of duration of targets when they are preceded by motion sequences.