A paradox of perceived speed and location in the Fröhlich effect

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Abstract

In the Fröhlich effect, the initial position of a moving object tends to be mislocated in its direction of motion. Not too surprisingly, when the duration of the movement is short, the magnitude of the spatial bias is also small. This motion duration property of the Fröhlich effect is a challenge for most existing models that predict little or no effect of duration. We measured localisation biases at the onset of moving objects in a psychophysical experiment using a forced-choice method. To reduce the effects of spatial and temporal predictability, two vertical lines were flashed one above the other at random spatial locations and random times. One of the two lines was set in motion as soon as it appeared, and the other remained static. Observers were instructed to report whether the top line was to the right or the left of the bottom one. Spatial offsets were controlled by interleaved staircases. We found that the magnitude of the spatial bias increases greatly with motion duration and reaches a plateau at about 200ms. Interestingly, before reaching the plateau, spatial biases were almost as large as the full trajectory of the object, suggesting that the moving object was almost perceived static. In a separate experiment, we measured the perceived speed for different durations and found a large over-estimation of perceived speed for durations shorter than about 200ms. Therefore, there seems to be a paradox in that the same moving object appears both almost static and moving very fast.

Keywords: motion perception, time perception, spatial localization

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