**Supplement 3:** Control experiment

We assumed that the illusion observed in the 3 experiments was not related to a response bias due to directional stimulus-response compatibility (i.e., Simon effect; (Simon 1969)). Indeed, participants were found more likely to reply on the same side as the direction toward whom a visual stimulus had moved (Bosbach et al. 2005) which is the opposite as what we obtained. Here, participants were more likely to click on the mouse key that was contralateral to the direction of the visual target motion. In addition, we run a control experiment where the response was not linked to directions. Six naive participants (5 women; 22.7±2.1 years) had to judge if the direction of the tactile motion was in the *same* or in the *opposite* direction as the visual target. The estimation was performed with the mouse fixed to the table perpendicular to the subject to avoid right and left references. The mouse upper button corresponded to the response “*same* direction” and the lower button to the response “*opposite* direction”. The rest of the procedure was the same as Exp. 1 except the oculomotor conditions which were reduced to *Left* and *Right* (*Static* not performed, as Exp. 3). Participant’ judgments (*same*/*opposite* direction as the visual target) were converted to literalities (*left*/*right*). As previous experiments, we modeled the participant’ responses as presented in (Eqn. 1). We used multivariable GLMM to extend the psychometric function to the group level as in equation 3 for each oculomotor condition (i.e., *Left*, *Right*). Results showed that the PSE statistically differed from zero for the *Left* conditions (-0.40, 95% CI ranging from -1.71 to -0.02) but not for the *Right* condition (-0.05, 95% CI ranging from -1.71 to -0.02). The analysis consistently showed a significant perceptual bias: the difference in PSE between *Right* and *Left* was 0.35 and bootstrap-based 95% CI were not crossing zero (from 0.08 to 1.04). This result corroborated the assumption that the response pattern in the study was not due to directional stimulus-response compatibility.

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