Abstract

Vibration as a cue in short distance speed discrimination

Vibration is one of the key cues in tactile speed perception, next to skin stretch, indentation and motion proprioception. In this study, we aim to examine the effects of skin stretch and vibration as cues in a tactile speed discrimination task. Specifically, we hypothesize that, vibratory cues can make a relative motion on a smooth surface feel faster than a comparable motion without vibratory cues. This should be true, especially when motion distance is kept short, to minimize effects of motion induced vibration compared to skin stretch. To rule out skin indentation as a cue, we moved a smooth glass plate, with no discernible texture features, beneath the right index finger. The fingertip was constrained by a fingertip holder along the movement axis of the glass surface, the hand rested on a handrest to rule out any proprioceptive cues. To test our hypothesis, we measured the precision of test subjects in a 2AFC task, when discriminating the speeds of two intervals of movement, whereby one of these intervals always was of a reference speed. The movements were composed of 7 different speeds (range 1 to 6 cm/s, reference speed was the median), 2 possible distances (4 and 8 mm) and 3 different external vibratory cue conditions (no external vibration in both intervals, vibration only during the reference stimulus, vibration only during the comparison stimulus). External vibration was applied by a vibratory device, placed beneath the moving glass plate.

Preliminary pilot results (N=3) suggest a noticeable shift between the 2 vibration conditions. External vibration during the comparison stimulus leads to an overestimation of its speed, compared to the reference speed with no external vibration. On the other hand, external vibration on the reference speed leads to an overestimation of the reference stimulus speed, and to a general drop in accuracy in higher comparison speeds. The control condition (no external vibration) is located between the 2 shifted vibratory conditions. The preliminary results are consistent with our hypothesis, that external vibratory cues can make motion on a smooth surface feel faster than a comparable motion without external vibratory cues.

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