I. Introduction

Malleability of body-representations. Peripheral sensory inputs update mental body-representations: evidence of updates triggered by the integration of vision, touch and proprioception (de Vignemont et al., 2005; Haggard et al., 2007).

II. Experimental Design

Pre-test: Arm-extent criterion* baseline

Audio-tactile stimulation

Post-test: Arm-extent Criterion*

Methods & Materials

- 16 participants (Exp. 1) and 15 participants (Exp. 2)
- Stimulus: a pre-recorded 185 ms tapping sound
- Apparatus: 6 loudspeakers, 2 sets of four miniature solenoids (2 cm between solenoids), flashing LEDS (fixation points), 6 marked tapping points; goggles

Audio-tactile stimulation†

- Experiment 1: Participants tapped on a surface while progressively extending their arm sideways
- Experiment 2: Participants sat with their arm extended sideways, and the experiment tapped on their still arm
- A tapping sound was presented in synchrony with each tap
- 4 conditions in which tapping sounds were spatially manipulated

Arm-extent criterion*

- A quantitative, implicit measure of distortions of body size: Distance task for dual tactile stimuli presented in two body locations (de Vignemont et al., 2005)
- “Which distance feels greater? Left arm (reference) or Right arm (test)?”
- 14 tactile judgments: 12 trials with equal distance, 12 trials differ by +/-2cm
- Arm-extent Criterion: Number of “greater distance” reports for the test (right) arm

III. Results

Experiment 1

- 4x2 ANOVA: condition x time of test (pre vs. post)
- 2-way interaction significant: F(3,45) = 4.1; p < .012
- Interaction driven by a significant difference between the pre- and post-test for the 2D condition only

Introspective results

Comparison with the Double distance condition

During the audio-tactile stimulation it seemed like...

<table>
<thead>
<tr>
<th></th>
<th>Zero distance</th>
<th>Quadruple distance</th>
<th>Double distance asynchron.</th>
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</thead>
<tbody>
<tr>
<td>My sound</td>
<td></td>
<td></td>
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<tr>
<td>My hand was caused by my own hand touching the floor</td>
<td>**</td>
<td></td>
<td></td>
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<tr>
<td>My hand was at the same location as the sound</td>
<td>**</td>
<td></td>
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<tr>
<td>My own arm extended</td>
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<tr>
<td>My own arm shrank</td>
<td></td>
<td></td>
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<tr>
<td>My own arm was out of my control</td>
<td>**</td>
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<tr>
<td>I couldn’t remember how long my arm was</td>
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<td></td>
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<tr>
<td>I couldn’t really tell where my hand was</td>
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<tr>
<td>The experience of my arm was less vivid than normal</td>
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Experiment 2

- Externally-generated taps delivered to the participants’ still arm
- No significant differences between pre- and post-test for any of the conditions
- No significant differences between conditions

IV. Discussion

- An effect on tactile perception observed for the 2D but not for the 4D condition

- Audition and malleability of body-representation

- First empirical evidence of a dependency of body-representation upon information from the auditory modality
- Self-produced action sounds can bias the tactile metric perception of objects in contact with one’s body

- Tactile perception referenced to an implicit body-representation, which is updated through auditory feedback

References