

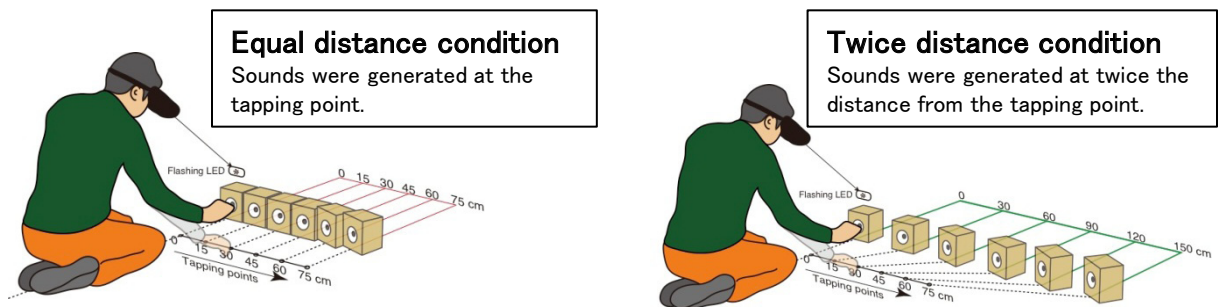


Hearing the body

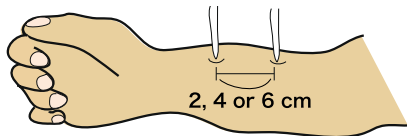
Action sounds recalibrate the perceived tactile distance

Abstract— We unconsciously know the shape of our own body and its configuration in space. This knowledge is called the body schema. When we grab a coffee cup or pass through a narrow space we have to refer to this body schema to guide our movement. In spite of its importance, the way in which a body schema is constructed from sensory inputs has yet to be revealed. We report a novel phenomenon. Participants tapped on a floor and listened to the resulting sound. When the sound originated at a point double the distance from that at which the participants actually tapped, the participants unconsciously felt their arms to be longer. In our presentation, we will demonstrate this phenomenon with some other examples that show how we can sense our own body through somatosensation, vision, and hearing.

● **Adaptation:** Extend the right arm to tap the floor by the hand while listening to the tapping sound. → Repeating tapping for several minutes.



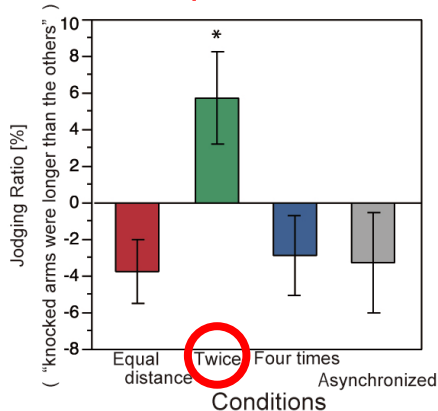
● **Measurement of the subjective arm length:** Judge the distance between two tactile points.



The tapping arm felt longer than the other.

→ The perceived tactile distance should be longer.

● **Results:** **Participants felt their arms longer!** (Only under the twice distance condition)



Conclusion

1. **Body schema is recalibrated by auditory feedback.** (Twice distance condition)
2. **Recalibration has spatial limitation.** (Four times condition)
3. **Recalibration requires the sense of agency.** (Asynchronized condition)

Related works

[1] A. Tajadura-Jiménez, A. Väljamäe, I. Toshima, T. Kimura, M. Tsakiris, N. Kitagawa, "Action sounds recalibrate perceived tactile distance," *Current Biology*, Vol. 22, No. 13, pp. R516-517, 2012.

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