Pull my finger and listen:

Attentional and multisensory contributions to the auditory Pinocchio illusion.

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i_mBODY lab

I. INTRODUCTION

Alterations of body perception

- Visual dominance in concomitance to other somatosensory signals may lead to a variety of changes in body perception [1-2]
- Though sounds have shown to alter body perception, less is known about the underlying processes [3-7]

The auditory Pinocchio illusion

- Pulling the finger zenithally and hearing an upward glissando contributes to perceiving a lengthened finger [6, 7].
- This does not seem to happen in other axes or directions (i.e., horizontally nor downwards) nor with a downward glissando [6, 7].
- Such a somatic association with an arbitrary, non-naturalistic sound, makes this paradigm of particular interest.

Could it be due to a top-down association?

Open questions:

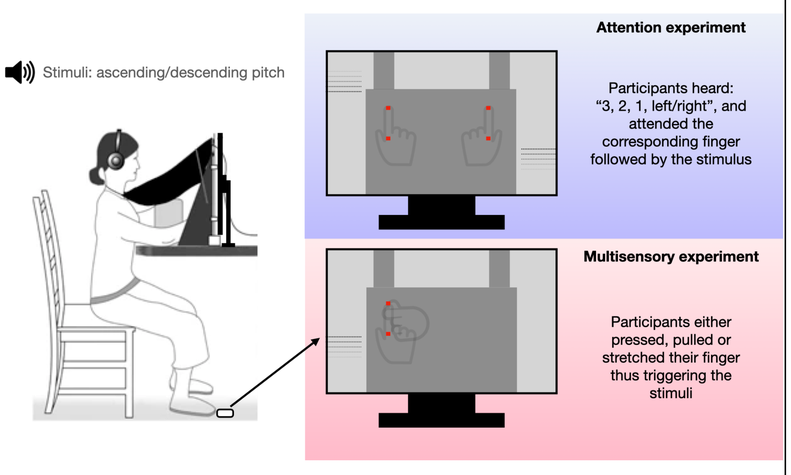
1) Could this be relying on an anchoring of the sound to the finger, say by means of attention, or are multisensory signals necessary?
2) If other sensory modalities are involved, which are these and to what degree do they contribute?

We investigate these questions in healthy participants improving existing setups and measuring devices through digital methods.

II. EXPERIMENTAL DESIGN

Auditory Pinocchio[6, 7]

- Participants estimated their finger whenever a visual mark reached their hidden fingertip and base.
- Several repetitions of the task across two experiments.
- An extended questionnaire followed.



Auditory Pinocchio: Finger length estimation measures

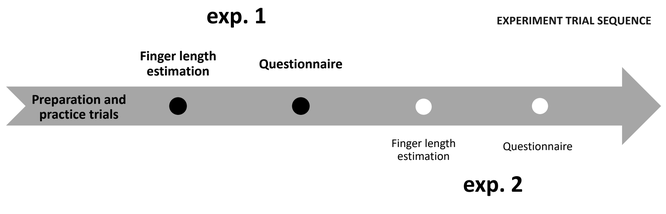
Exp. 1 - Attentional anchors for the illusion

Manipulated vars.:
Sound: ascending and descending pitch.
Attention: attended and non attended finger.

Exp. 2 - Multisensory contributions to the illusion

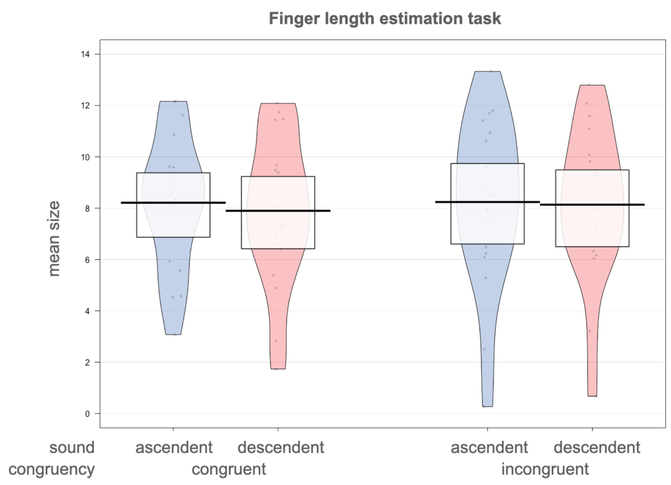
Manipulated vars.:
Sound: ascending and descending pitch.
Gesture: pulling, stretching, touching.

Participants: N = 17 (target N = 40).

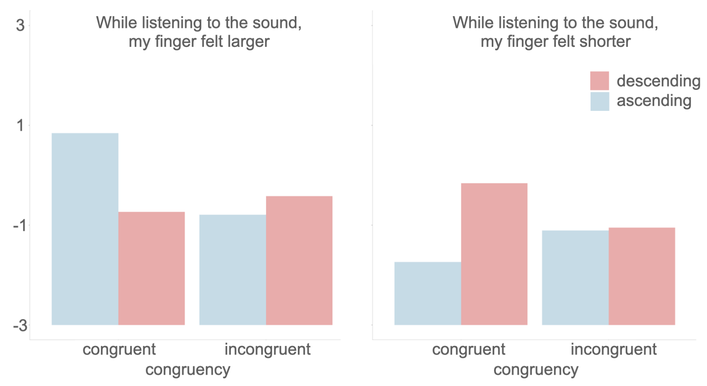


III. RESULTS

Experiment 1

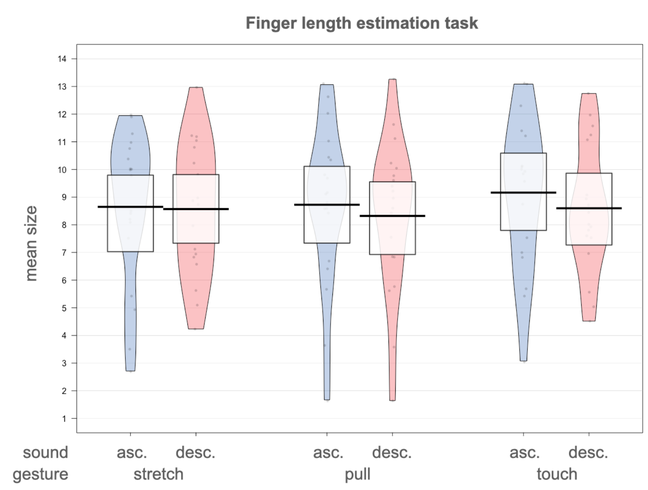


Finger length estimation: BF_{01}: The null model is 2.69 times more likely than the model including congruence, 2.83 than that including sound, and 22.13 than that including congruency, sound and their interaction.

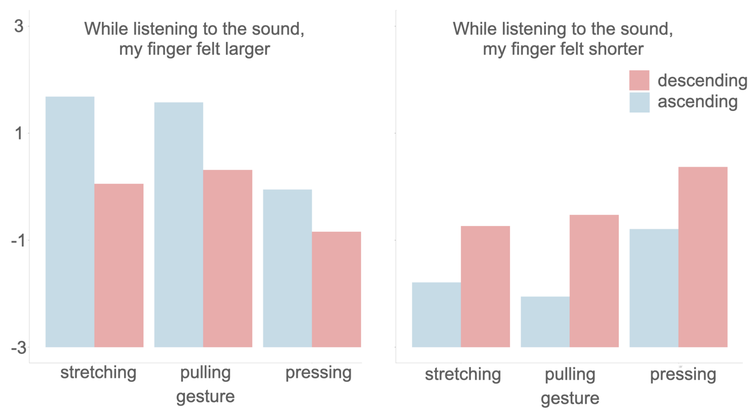


Questionnaire: ART ANOVAs yield for left: no effect of congruence ($F(1, 16) = 2.51$, $p = .13$) nor sound ($F(1, 16) = 1.88$, $p = .19$) but for their interaction ($F(1, 16) = 11.43$, $p < .005$). For right: no effect of congruence ($F(1, 16) = 0.01$, $p = .93$) a trend for sound ($F(1, 16) = 4.29$, $p = .05$) and an interaction effect ($F(1, 16) = 9.28$, $p < .01$).

Experiment 2



Finger length estimation: BF_{01}: The null model is 1.12 times more likely than the model including sound, 6.45 than that including gestures, and 38.14 than that including congruency, sound and their interaction.



Questionnaire: ART ANOVAs yield for left: main effect of sound ($F(1, 16) = 12.$, $p < 0.005$), gesture ($F(1, 32) = 9.8$, $p < 0.001$) but no interaction ($F(1, 32) = 1.19$, $p = .32$). For right: main effect of sound ($F(1, 16) = 16.28$, $p < .001$), gesture ($F(1, 32) = 9.8$, $p < 0.001$) and no interaction effect ($F(1, 32) = 0.02$, $p = .97$).

IV. DISCUSSION

- Top-down associations (i.e., attention) seem to modulate explicit but not implicit measures.
- In contrast to existing literature, no evidence of multisensory signals differentially modulating the implicit measure. We used a higher resolution measure; however, the findings are inconclusive yet and more data is required to reach conclusive evidence.
- Different gestures and sounds differentially contribute to explicit perception of extension and shortening, but there is no interaction.
- Stretching and pulling result in a greater effect of apparent extension according to explicit measures, this is in accordance with participants reports.
- Data collection is ongoing.

V. ACKNOWLEDGMENTS

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VI. REFERENCES

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