Title: Sensorimotor conflicts related to somatic passivity experiences louden quiet voices in healthy listeners

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Abstract: 2.53

Passivity experiences, defined as the feeling of the intervention of someone else on the patient’s perceptions, actions, and thoughts, have long been considered as one of the hallmarks of schizophrenia. They include auditory verbal hallucinations in form of perception of speaking or commenting voices. Based on previous research, we have recently described a robotic procedure able to induce somatic passivity experiences in healthy individuals by creating sensorimotor conflicts between participants’ motor action and its corresponding somatosensory feedback on the back. However, it remains unknown if this robotic manipulation could induce auditory verbal hallucinations that have also been conceptualized as passivity experiences. Consequently, here we investigated whether sensorimotor conflicts known to induce somatic passivity and alien agent experiences can affect voice perception and further explored sensorimotor effects on discriminability and perceived loudness of ambiguous vocal stimuli.

Using two auditory tasks while participants actuated the robotic system, we conducted two studies in healthy participants (N1 = 30, N2 = 30) in which we performed a psychophysical assessment of self-other voice discriminability and of voice loudness perception. In the self-other task, participants estimated which of two morphed voices sounded more like their own and in the loudness task, which of the two voices was louder.

Our data revealed an effect of sensorimotor conflicts on voice loudness perception. In particular, quiet voices were perceived as louder during simultaneous exposure to passivity experience-inducing sensorimotor conflicts. These effects were absent during self-other voice discrimination. Moreover, we found that robotically-induced passivity experiences in healthy participants are associated with robot-induced (but spontaneously-reported) negative emotions during post-experiment debriefing, mimicking similar symptomatic associations in patient populations.

Our results suggest that passivity experiences and voice perception rely at least partly on common brain mechanisms of sensorimotor integration. We interpret our results within the framework of the forward model of sensorimotor control.