

From audiovisual perception to action: The processing of spatiotemporal components

ABSTRACT:

The aim of this project was to characterize the human perceptual system through a continuum of information complexity - from unimodal to multimodal events, from static to dynamic stimuli and with the execution of motor actions in accordance with the displayed perceptual scenario. We conducted psychophysical experiments with auditory, visual and audiovisual information to understand how the different sensorial modalities are informative of the temporal and spatial demands of the task.

In a localization task, we tested how participants could discriminate stimuli presented at various spatial positions, the effect of training and of the type of audio device. This study demonstrated that participants' overall localization error decreased after a training period, as well as with the use of headphones in detriment of in-ear phones.

The accuracy and precision of participants' estimation of an approaching object in a pass-by trajectory was tested in a temporal task with different intermission periods of stimuli presentation. We observed that precision was inversely related with the intermission periods and that different cues were used as a function of the complexity of the task.

Additionally, a cross-modal integration experiment was conducted to test the synchronization of biological motion, through the manipulation of auditory and/or visual cue availability. Participants synchronized not on the basis of local motion provided by different body segments, but on the global motion pattern. Surprisingly no superior performance was obtained for the audiovisual condition.

In conclusion, we verified that the variables providing more accurate information to the perceptual system are dependent on the type of processing – temporal, spatial or both. With motor execution we observed that sensorial modalities could be weighted differently to maintain performance in the task. These results should be further explored to understand the correspondence of information between auditory and visual modalities and ultimately contribute to the understanding of sensorial fusion.

Keywords

Action – Perception, Audiovisual perception, Multimodality

Published Work:

Pazhoohi, F., Silva, C., Lamas, J., Mouta, S., Santos, J., & Arantes, J. (2018). The effect of height and shoulder-to-hip ratio on interpersonal space in virtual environment. *Psychological Research*. doi: doi.org/10.1007/s00426-017-0968-1

Silva, R. M., Lamas, J., Silva, C. C., Coello, Y., Mouta, S., & Santos, J. A. (2017). Judging time-to-passage of looming sounds: Evidence for the use of distance-based information. *PLoS ONE*, 12(5): e0177734. doi: 10.1371/journal.pone.0177734

Os textos são da exclusiva responsabilidade dos autores
All texts are of the exclusive responsibility of the authors

Silva, C., Mouta, S., & Santos, J. (2016). Choosing audio devices on the basis of listeners' spatial perception: A case study of Headphones vs in-Earphones. In *Consumer Electronics-Berlin (ICCE-Berlin), 2016 IEEE 6th International Conference on Consumer Electronics* (pp. 129-132). IEEE, Berlin, Germany. doi: 10.1109/ICCE-Berlin.2016.7684737

Silva, R. M., Sousa, E., Fonseca, P., Pinheiro, A. R., Silva, C., Correia, V. M., & Mouta, S. (2016). Analysis and quantification of upper-limb movement in motor rehabilitation after stroke. *Converging Clinical and Engineering Research on Neurorehabilitation II: Proceedings of the 3rd International Conference on NeuroRehabilitation (ICNR2016), October 18-21, 2016, Segovia, Spain* (pp. 209-213). doi: 10.1007/978-3-319-46669-9_37

Researcher's Contacts:

PI – Sandra Mouta

Email: smouta@gmail.com