Report – Vertax

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There is a debate on whether and how vestibular input affects visual distance perception. The evolved navigation theory states that downward distances are perceived as longer because the organism is trying to avoid situations with the risk of falling. Contrary to this, the gravity theory claims that objects on upward slopes are perceived as being farther because it takes more effort to walk to them. In this project we seeked to find how the vestibular input affects distance estimations.

The project required coordinated interaction between 4 labs in 3 universities of different countries, these were the NeuroCogSpace lab at Brain Imaging Centre of the RCNS, HAS (Hungary), the EVENT-lab at the University of Barcelona (Spain), the Immersive VR lab and the Action and Body Research Group both at the University College of London (UK), The project consisted of two parts, in the first part Elena Kokkinara (EVENT lab) traveled to the hosting lab and designed a virtual reality experiment together with David Swapp according to the specifications set up by the collaborators. This way they implemented a task where participants had to look up, straight or down in virtual reality and tell how far they see objects appearing for short times in the virtual reality booth. In the second part Agoston Török (NeuroCogSpace lab) traveled to the hosting lab and conducted two experiments with David Swapp and Elisa Ferre.

In these two experiments participants judged distances in virtual reality where visual input was the same for all three inclinations. In the first experiment participants changed their head's position after 18 trials in the same inclination, in the second they tilted their head from trial to trial causing less habituation to the vestibular input. In both experiments we used either galvanic vestibular or sham stimulation while they saw the objects. The results from both experiments supported the predictions of the gravity theory. Furthermore, in Experiment 1 only the galvanic vestibular stimulation led to gravity bias whereas in Experiment 2 we found gravity bias in both conditions, indicating the effect of continuous vestibular input. These results show that gravity bias is an effect of multisensory interaction between vision and the vestibular sense.

1. FIGURE DAVID SWAPP, AGOSTON TOROK AND ELISA FERRE AFTER THE COMPLETION OF THE EXPERIMENTS.