Comparison of vestibular input statistics during natural activities and while piloting an aircraft

Running title: Vestibular inputs in natural activities and while piloting

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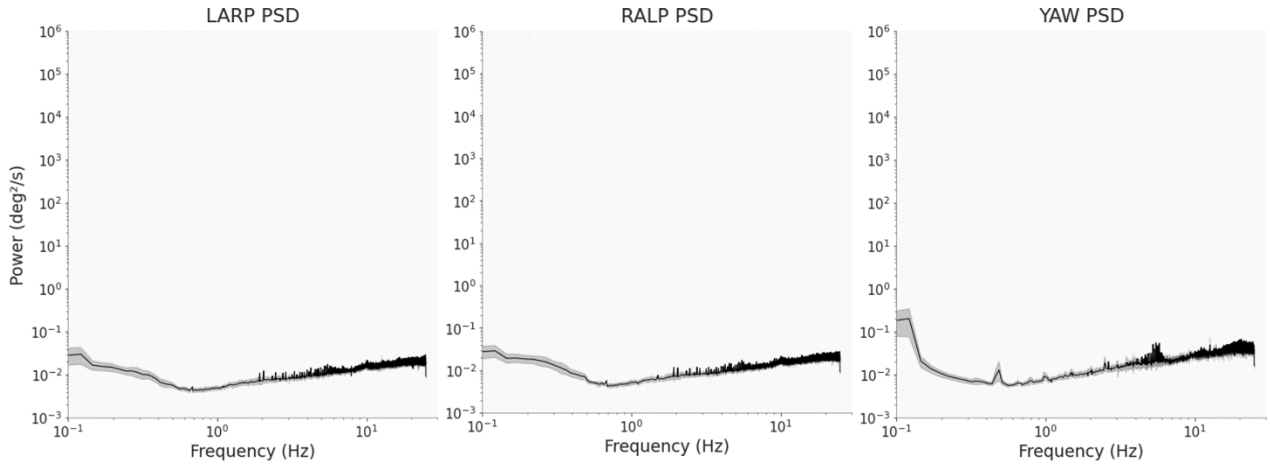
Environmental stimuli



Supplementary Figure 4: Population-averaged power spectra of the cabin's velocity signal projected in the LARP, RALP and YAW planes, with corresponding 95% confidence interval (shaded areas) during the simulated flight.

We were interested in the characteristics of the environmental vestibular stimuli experienced by the pilots during the manual navigation task. In particular, we wondered whether the peak in power in the spectra of the head angular velocity signals could have been caused by some external resonant element located at the scale of the helicopter cabin. To assess the potentially nefarious effects of vibrations stemming from the helicopter simulator, we computed the power spectra of the velocity signal of the cabin using an IMU attached to its roof (Supplementary Figure 4). The power spectra strongly differed from the ones measured at the participants' head: they lacked the inverted 'U' shape, and the power appeared to be nearly constant over the whole frequency range. It appears that the aforementioned peak does not seem to be generated by mechanical vibrations of the whole cabin.

We note that, contrary to Carriot *et al.* (2014), the frequency content of the environmental stimuli did not follow a single power law. We attribute this discrepancy to the atypical nature of the present environmental stimuli: movements of the cabin are generated by rotations and translations of a mobile platform, driven by manipulanda and constrained by the physical limitations of the simulator. Hence, pilots experience environmental stimuli that strongly differ from "white noise".