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# COGNITIVE FUNCTION OF SUBORBITAL SPACECRAFT PILOTS

**Abstract**

Flying a suborbital spacecraft is stressful and cognitively demanding. The climb to suborbital altitude and re-entry are particularly cognitively demanding phases. Thus, understanding the impact of in-flight procedures on pilot cognitive performance (CP) at various flight stages, and detecting the onset of CP decline can help improve the safety of suborbital operations.

6 Participants flew 8 simulated suborbital missions (2 nominal day, 2 nominal night, 2 contingency day and 2 contingency night) in the Suborbital Spaceflight Simulator (SSFS) flying the SpaceShipTwo mission profile. To understand the changes in human brain functions and neural mechanisms, participants wore a wireless brain signal acquisition system. This device uses a 14-channel high-resolution (2048 samples/s, down-sampled internally to 128 samples/s) signal acquisition wireless neuro-headset.

Flight procedural complexity modulated the EEG power spectrum. Demanding procedures such as climb to suborbital space and responding to contingencies were associated with higher EEG power in the higher frequency bands. Less demanding procedures such as zero-g and glide to landing were associated with lower EEG power over the same frequency bands. These results suggest that EEG recordings may help to evaluate a suborbital pilot's CP in actual flight scenarios, and may assist in the prevention of accidents.