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Behaviour, Performance and Psychosocial Issues in Space (1)

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NEUROCOGNITIVE EFFECTS OF A 3D VIRTUAL REALITY MOOD INDUCTION SYSTEM IN MARS-500 CHAMBER.

Abstract

Mars 500 provides the unique opportunity to explore some aspects linked to individual and social adaptation to isolated and confined conditions as well as performance in an extreme environment. Here we present preliminary data of one of our experiments participating in Mars-500. We show pilot data related to effects of new virtual reality (VR) technology system called EMMA over neurocognitive performance in first phase of our Mars-500 study. To measure this effect we used winSCAT neurocognitive battery together with EMMA system. The Spaceflight Cognitive Assessment Tool for Windows (WinSCAT) was developed as a tool to support medical operations at NASA and to monitor the neurocognitive status of space crews. WinSCAT is a time-constrained test of cognitive abilities. WinSCAT is routinely performed by astronauts aboard the ISS. The test uses cognitive subtests measuring concentration, working memory, attention, memory, spatial processing, math skills and processing efficiency. During the first 4 months (Phase 1) of Mars-500, subjects have alternate access to EMMA system: they can use the VR system during months 2 and 4 and EMMA could not be used during months 1 and 3. Intra-subjects experimental design will be used for this phase 1. Sessions will consist on minimum of 3 sessions of 30 minutes per week. During phase 2, non restricted use of EMMA will be allowed for the remaining of the mission. Additional tools for analysis of EMMA usage will be also implemented. We expect to obtain better measures in mood and social adaptation tests in relation to EMMA usage. We will also study possible correlations with performance using winSCAT neurocognitive test data. We expect to obtain better results in winSCAT on subjects on months of EMMA usage and with those using more frequently the system. We base our hypothesis on the data supporting that some decrement on cognitive performance may be derived from mood changes during long term space missions. Psychologically this can be attributed to the environmental conditions (e.g. confinement, workload, social situation, etc.). Physiologically this is reflected by changes in the brain. In the lasts decades, has been developed a set of procedures able to induce emotional changes in experimental subjects in a controlled way, manipulating variables inside

laboratory. This set of procedures allows one to go more deeply into the knowledge of emotions and their relations with cognition. This set of procedures has been called mood induction procedures (MIPs). EMMA represents one virtual MIP procedure.