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Behaviour, Performance and Psychosocial Issues in Space (1)

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TOWARDS TELEOPERATION PERFORMANCE AND PSYCHOPHYSIOLOGICAL STATE ASSESSMENT IN THE SIRIUS-19 ANALOG CAMPAIGN

Abstract

Future lunar bases and long duration space travel have increased the scientific interest in the potential negative effects that confinement and isolation can have on a crew's interpersonal behavior, cognitive state and performance. Given the hazardousness of these missions, it seems crucial to analyze the impact of Human Factors on the daily parameters of operators in order to enhance both their safety and performance. In order to progress towards a more global assessment of a confined operator's cognitive state we propose to analyze subjective and objective measures regarding a professional task. Hence, this study evaluates the correlation between the participants' performance in a teleoperation task with their reported mood, motivation and their measured cardiac activity during a ground-based analog space mission. The facility considered was the NEK at IBMP in Moscow, Russia. Six participants (3 females; Mean Age=33,4, $\sigma = 6,656$; 2 Americans and 4 Russians) were confined during 4 months in this facility. Over the period of confinement, they undertook seventeen teleoperation sessions. The teleoperation task consisted in the remote control of a digital rover that was used to collect a sample on the lunar surface. Completion time and accuracy were measured for each session to evaluate the participants' performance. Training sessions were run before and after the mission. Also, the participants filled shortened versions of the PANAS and the IMI questionnaires to assess their motivation and mood before the task. Additionally, their cardiac activity was measured during the task. The main results are significant Spearman correlations between the reported feeling of confinement and task completion time ($\rho = 0.375, p < 0.01$) and the reported feeling of confinement with the positive affect component of the mood ($\rho = -0.547, p =< 0.01$). In addition to that, a general decrease of motivation was observed along the mission with the exception of a booster created by the moon orbiting period. The results confirm a link between confinement stressors and the crew's performance during this professional task as found in other analog missions such as the Lunares and MDRS. The project is in continuous expansion, as more data is required to confirm the obtained results and to pursue their analysis. This work was intended to lay the foundations for a neuroergonomic approach of space operators' assessment.