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GENERAL TENDENCIES IN EXTERNAL COMMUNICATION OF THE AUTONOMOUS CREWS
UNDER SIMULATION OF INTERPLANETARY MISSIONS

Abstract

The results of communication studies in the Mars-500 project have shown that simulation of the autonomous spaceflight conditions may cause manifestations of the psychological "detachment" phenomenon (Kanas, Manzey 2004). It implies a progressive increase in the crew's autonomy, as well as depression, decrease in motivation, morale and overall activity of the crew. Such "detachment" may lead to avoiding of the Mission Control's (MCC) recommendations, as well as predominance of decision-making based on their own values and priorities. The present study of crew-MCC communication was conducted within the protocol of the 4-month chamber isolation experiment SIRIUS-19, with participation of international mixed gender crew (3 men and 3 women, age from 29 to 45). In this experiment, a 5-minute crew-MCC communication delay was simulated. The main source of data for the analysis of communication were the crew's video messages to MCC (especially, Daily planning conferences). Several parameters including the number of categories reflecting the use of stress coping strategies ("confrontation", "planning", "taking responsibility", etc) were utilized by the independent experts for the content analysis of crew communication. The video recordings were also processed using FaceReader software in order to detect manifestations of basic emotions in the crewmembers' facial expressions during contacts with MCC. Speech acoustic characteristics reflecting the level of speaker's psychophysiological tension were analyzed using Praat software. Statistical approach included factor analysis, Mann-Whitney and Wilcoxon criteria. Analysis of the crew-MCC communication in SIRIUS-19 experiment confirmed manifestations of the "detachment" phenomenon, previously detected in the Mars-500 project: a tendency for the progressive decrease throughout isolation in the total communication volume (average message duration, daily number of messages), in the number of statements expressing needs (requests), problems, and time related

issues. The study of basic emotions manifestations in crewmembers' facial expressions revealed reliable tendencies towards an emotional expressiveness changes in communication for most of the subjects. In three crew members, a decrease in the general emotionality of communication was detected, in two - an increase, in one subject, the stability of the emotional state was observed. The study of speech acoustic characteristics revealed tendencies to an increase in the number of voice impulses and shimmer effects in the speech signal, as well as to a decrease in the number of unvoiced speech fragments and in the F0 of speech. As in the Mars-500 experiment, landing simulation in the halfway of isolation was a significant event that influenced the communication behaviour of SIRIUS-19 crew.