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Complementary approaches to assess the crewmembers' behavioral profiles during Mars-500 experiment

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Humans on Mars are one of the challenges of future planetary explorations. Monitoring the interplanetary crew is one of the objectives of psychophysiological investigations for better understanding the long duration adaptive processes. What could be the crewmembers' behavioral profiles in isolation, in confinement and in extended periods of time? A wide panel of approaches was applied during Mars-500 experiment to assess the individual and social behavior in a simulated 520-day mission to Mars. We present two associated methods on the evolution over time of the interpersonal relationships between the crewmembers. We focused our analysis on the non-verbal behavior at the individual level in terms of interactions and at the social level in terms of social cohesion. The Mars-500 facilities provided the unique opportunity to emphasize these behavioral issues and to assess them in complementary approaches: ethological observations using video recordings and a Wireless Group Structure (WLGS) tool using radio satellites.

The observational tool is a quantitative description of actions and interactions, e.g. visual interactions, object interactions and body interactions between the subjects (duration of occurrence). The WLGS tool measures the time spent together for two subjects (crew cohesion time). The common features are objective assessments. The protocols of data collection on each subject (n=6) were coordinated on the Mars-500 experiment timeline, once per two weeks, on Tuesday. The video recording was made during a collective activity, at breakfast time. The WLGS monitoring was made over 18 day hours.

The ethological results showed different behavioral profiles per subject and according to the mission day with an emphasis on longer visual interactions than object and body interactions, and low or high durations of collective activity. Correlations with the crew cohesion time

complement the findings, underlie the individual differences and reinforce the social relationships changes observed over the mission.
The main learned lessons are, from a scientific viewpoint, to take into account the individual profile as contributing factor to the social adaptation and, from a methodological viewpoint, to implement associated data collections at the same time and for the same duration in order to validate the correlative results.

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