Human Factors

research and technology division

Distributed Team Decision Making

Objective

Interpersonal tensions are one of the most problematic issues in long-duration space missions. They can jeopardize mission success by preventing crew members from cooperating on mission-critical tasks. Goals of this study are to (a) determine the effects of task- and team-related stressors on team performance in challenging situations; (b) develop and validate technologies to monitor affective responses of individual team members, and (c) identify effective team interaction strategies. These will establish a basis for countermeasures to prevent deterioration of team performance.

Approach

A computer-based simulated search and rescue mission set in Antarctica was developed to study team interaction and decision making performance. Four-member teams work together to locate a lost party sent to repair a malfunctioning communication antenna. Teams must develop plans and strategies, share information, manage resources, and cope with unexpected problems under time pressure. Both task and team stressors are manipulated to induce cognitive and emotional arousal. Task performance, physiological measures (ECG, respiration, SCL, EMG, and PPG), voice and email communication, personality, team dynamics, and facial affect measures are being analyzed to identify the relations between stress, team interactions and task performance.

Initial studies indicate that success on the task reflects the extent of cooperation among team members; effective collaboration can overcome task stresses. Team success also reflects the degree of trust and acceptance team members experience. Negative interpersonal interactions interfere with successful team performance. Physiological reactivity to task and team stressors can be detected and thus can serve as a trigger for introduction of countermeasures.

Impact

The present study provides integrated physiological, self-report, behavioral, and performance measures from teams working together over time on a common task. Positive stress-coping behaviors extracted from the findings will serve as a basis for training crews to manage challenging events and interpersonal problems arising in long-duration space missions. Technologies will be developed for use by space crews as self-monitoring and stress-management systems.

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