Pilot Studies of the PSE-1

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Abstract

A series of preliminary studies were conducted to test the ability of the PSE-1 to measure stress attributable to workload demands or perceived risk. Because the sample sizes were small and because the stress situations were not subject to experimental control, the results could not be considered conclusive. However, the tenor of the findings suggests that the PSE-1 can be used to detect and quantify stress induced by task requirements and operational situations.

Test #1

To determine whether stress patterns appear in the voices of individuals in circumstances of perceived risk, recordings of astronaut communications during space missions were analyzed with the PSE-1. The voice patterns typically associated with stress due to falsification also appeared in astronaut communications where there could be no doubt as to speaker's veracity. It was found that stress ratings tended to be higher in situations of danger or of task difficulty than in normal operational situations.

Test #2

To examine the correlation between stress estimates based on voice analysis and situational analysis, cockpit voice recordings were obtained for three fatal aircraft accidents. Two blind and independent ratings (one based on a written transcript and accident investigation report, the other on PSE-1 analysis) exhibited correlation of 0.69. Further, the voice analysis ratings tended to progress from low to high as the accident situation evolved.

Test #3

To determine whether stress patterns appear in the speech of individuals not in physical danger but whose work is demanding and likely to induce task-related stress, a PSE-1 analysis was made of air traffic controller messages transmitted at Philadelphia Airport during a two-hour period containing no emergencies or unusual events. The results tended to confirm the general hypotheses that command messages are more stressful than simple requests for information, that dealing with general aviation pilots is more stressful than dealing with presumably more experienced commercial pilots, and that non-routine events are more stressful than routine events.