Personnel selection, training could mitigate effects of cognitive lock-up in automation operators

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Automation failures have been the cause of such widely reported disasters as the crash of Air France Flight 447 in 2009, with most of the focus placed on deficiencies in the automated system. Although automation does help in avoiding human error in completing tasks, people are still needed to monitor how well the automated system is operating.

A paper just published in *Human Factors: The Journal of the Human Factors and Ergonomics Society* describes a correlation between an operator's working memory and ability to sustain attention and a phenomenon known as cognitive lock-up, when an individual focuses longer on an initial failure event than on subsequent failures.

Monitoring of systems often requires multitasking: There is usually more than a single function to monitor, and when one function fails, it likely leads to subsequent failures, which can occur in rapid succession. The operator can experience cognitive lock-up if lacking in ability or training in working memory and sustained attention.

Meike Jipp, a researcher at the German Aerospace Center (DLR), noted, "Previous research had focused only on identifying task- and automation-related predictors of cognitive lock-up." She studied the reaction time, working-memory ability, and sustained attention ability of 85 students (18-39 years old) as they monitored a simulated flight display and engine

warning display similar to those in the Airbus A320. The first failure was with the autopilot, followed by a failure of one of the three engines.

Jipp's findings showed that, to a significant degree, individuals with better working memory not only were able to correct an initial system failure quickly but also could switch their attention to secondary failures more quickly. Furthermore, her results upheld her hypothesis that the influences of working memory and sustained attention on the reactions of human monitors increase across failures.

These results expand the knowledge base in determining characteristics that can be used to develop systems and processes to help prevent cognitive lock-up and the sometimes catastrophic failures it can cause. Examples Jipp notes are "enabling automation to prioritize failures and communicate such information, . . . improve the task environment, . . .and modify personnel selection strategies and establish training procedures for working memory, cognitive flexibility, and sustained attention."

More information: "Reaction Times to Consecutive Automation Failures: A Function of Working Memory and Sustained Attention" hfs.sagepub.com/

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