Staying on task in the automated cockpit

May 6 2014

Automation in the cockpit is traditionally believed to free pilots' attention from mundane flight tasks and allow them to focus on the big picture or prepare for any unexpected events during flight. However, a new study published in *Human Factors* indicates that pilots may have a hard time concentrating on the automated systems that now carry out many of the tasks once completed by humans.

"The automated systems in today's cockpits assume many of the tasks formerly performed by human pilots and do it with impressive reliability," says Stephen Casner, coauthor of "Thoughts in Flight: Automation Use and Pilots' Task-Related and Task-Unrelated Thought" and research psychologist at NASA's Ames Research Center. "This leaves pilots to watch over the automation as it does its work, but people can only concentrate on something uneventful for so long. Humans aren't robots. We can't stare at a green light for hours at a stretch without

getting tired, bored, or going crazy."

Researchers Casner and coauthor Jonathan Schooler designed a flight simulation study in which they asked pilots to follow a published arrival procedure into New York's busy John F. Kennedy International Airport. As the pilots navigated the flight, they were asked about what they were thinking during various levels of automation and to assign their thoughts to three categories: the specific task at hand, higher-level thoughts (for example planning ahead), or thoughts unrelated to the flight (e.g., what's for dinner).

The pilots reported an increase in big-picture flight-related thoughts when using higher levels of automation, but when the flight was progressing according to plan and pilots were not interacting with the automation, their thoughts were more likely to wander.

"The mind is restless," says Schooler, a professor of psychological and brain sciences at the University of California, Santa Barbara. "When we're not given something specific to think about, we come up with something else to think about."

"Pilots limited their off-task thoughts to times in which the automation was doing the flying and all was going according to plan," adds Casner. "Nevertheless, there seem to be potential costs to situations in which pilots disengage from a highly-automated task. What happens when something suddenly goes amiss after long periods of uneventful flight?"

The study's authors concluded that although automation frees pilots' minds from tedious tasks and enables them to focus on the overall flight, it might inadvertently encourage them to devote time to unrelated thoughts. Casner notes that on the basis of these findings, researchers studying cockpit automation might consider rethinking the interaction between humans and machines.

"As technology grows in capability, we seem to be taking the approach of using humans as safety nets for computers," he says. "We need to sort out the strengths and weaknesses of both humans and computers and think of work environments that combine and exploit the best features of both to keep humans meaningfully engaged in their work."

Provided by Human Factors and Ergonomics Society