Novice pilots improve visual responses to simulation by watching experts' eye movements

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Novice military pilots can improve their visual responses to a simulated emergency procedure by observing the eye movements of expert pilots, according to new research from SUNY Downstate Medical Center. The findings were presented recently at Neuroscience 2017, the annual meeting of the Society for Neuroscience, recognized as the world's leading source of emerging news about brain science and health.

Wayne J. Riley, MD, MPH, MBA, MACP, president of SUNY Downstate Medical Center, said, "These findings reflect the breadth of subjects pursued by scientists at SUNY Downstate and illustrate how funded research is important to keeping our citizens both healthy and safe."

Senior author Stephen Macknik, PhD, professor of ophthalmology, neurology, and physiology and pharmacology at SUNY Downstate, explained, "We discovered that when novice pilots learn how to move their eyes by watching the eye movements of expert pilots via eye tracking technology, they rapidly improve their visual scanning strategies in the cockpit, even without explicit instructions." He added, "This breakthrough could pave the way for a new type of eye-movement based training of aviators."

High-quality visual input is restricted just to the very centers of our retinas. Our eyes thus make hundreds of thousands of movements to combine these snippets of information into visual representation of our immediate environment. Previous research has shown that eye movements in response to visual stimuli can serve as a biomarker for brain states such as fatigue or high mental concentration.

To explore how eye movements might relate to expertise in a challenging task, researchers at SUNY Downstate evaluated eye tracking as an objective means of classifying novice versus expert military helicopter pilots. The study found that eye movement differences are so pronounced and predictable between novices and experts that computers can use an eye-tracking algorithm to accurately classify them more than 80 percent of the time.

The researchers also explored whether the differences in eye movements between expert and novice pilots could be developed into a training regimen. One group of novices watched a video in which an expert pilot solved a complex emergency procedure in a military flight simulator. Another group watched the same video, but with a representation of the expert pilot's eye movements superimposed onto the video (a dot moved around the screen in real time, indicating eye position).

When retested, only the latter group had acquired expert eye movement techniques. This occurred without explicit instructions about what the dot was or how to use it. The results suggest that modeling expert eye movements may benefit pilot training.

Provided by SUNY Downstate Medical Center