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Augmenting fighter pilot training with a non-invasive eye-tracking system: An evaluation in an operational training context

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Content

Augmenting fighter pilot training with a non-invasive eye-tracking system: An evaluation in an operational training context

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ABSTRACT

Objective & Significance

The proposed presentation discusses research indicating that pilot training can be improved using eye tracking technology. This study has been conducted with subject matter experts in an operational training context, demonstrating feasibility for real-world use.

Background

A pilot's eye behaviour can give important clues about how they are allocating their attention and what their level of situation awareness is. Eye tracking systems have considerable potential as a training tool, as they provide an accurate and objective way to measure eye behaviour. While many previous systems have been impractical outside of laboratory settings, new console-mounted tools have emerged which enable precise eye and head-tracking without requiring a physical device to be worn by the pilot. The current research involves a mixed methods study of a console-mounted eye-tracking system for flight crew training in an introductory fighter pilot training context. The primary aim is to determine whether providing instructors with an objective real-time visualisation of students' scanning behaviour facilitates training.

Methods

Data is being collected across several months in a full flight simulator environment. Participants are training instructors (N = 6) and students (N = 4) involved in introductory fighter pilot training within the Royal Australian Air Force. Students' eye and head movements are tracked using a camera integrated into the simulator cockpit, and a prototype Crew Training System application then overlays the eye and head movements onto the instructors' visual display of the cockpit in real-time. The primary manipulation used is the availability of real-time eye-tracking for training instructors; while students' eye movements will be recorded in both a control and an intervention condition, eye movement data is only visible to instructors in the intervention condition. Subjective data is being recorded through questionnaires and interviews. Interviews are being used to collect rich qualitative data from instructors on how they used the eye tracking data and how this compared to the control condition (where the data was not present). Questionnaires include ratings of workload, situation awareness, instructors' perceived ability to recognise scanning behaviour, and system usability. Ethical clearance for this project was provided by the Departments of Defence and Veterans Affairs Human Research Ethics Committee.

Results & Implication

Providing instructors with a real-time visualisation of students' glance behaviour is expected to facilitate coaching and improve training outcomes. Specifically, it is expected to improve instructors' ability to diagnose scanning-related issues and increase their situation awareness of students' performance, relative to the control condition where the eye movement data is not present. The primary implication of this is that eye tracking technology may be an assistive tool during pilot training and could help training providers up-skill pilots faster.

Disclaimer: The opinions expressed therein are those of the authors and do not necessarily reflect those of Defence or DVA, or reflect requirements under extant policy.

Keywords : Eye tracking, EEG, fNIRS, other measurement methods