

Identification of effective visual problem solving strategies in a complex visual domain

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visual problem solving strategies, visual domains, decision making, eye movements, air traffic controllers

Abstract

Students in complex visual domains must acquire visual problem solving strategies that allow them to make fast decisions and come up with good solutions to real-time problems. In this study, 31 air traffic controllers at different levels of expertise (novice, intermediate, expert) were confronted with 9 problem situations depicted on a radar screen. Participants were asked to provide the optimal order of arrival of all depicted aircrafts. Eye-movements, time-on-task, perceived mental effort, and task performance were recorded. Eye-tracking data revealed that novices use inefficient means-end visual problem solving strategies in which they primarily focus on the destination of aircraft. Higher levels of expertise yield visual problem solving strategies characterized by more efficient retrieval of relevant information and more efficient scan paths. Furthermore, experts' solutions were more similar than intermediates' solutions and intermediates' solutions were more similar than novices' solutions. Performance measures showed that experts and intermediates reached better solutions than novices, and that experts were faster and invested less mental effort than intermediates and novices. These findings may help creating eye-movement modeling examples for the teaching of visual problem solving strategies in complex visual domains. (PsycINFO Database Record (c) 2016 APA, all rights reserved)

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