Applying Video Occlusion Technique to Test and Train Law Enforcement Officers’ Perceptual Cognitive Skills

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Research Purpose

This project applies the Expert Performance Approach (EPA) to design a Training Program for law enforcement officers that uses the Video-Occlusion method developed in sports expertise research. The training addresses Defensive Tactics that an officer may perform when a civilian subject makes a sudden and aggressive attacking movement against the officer. Within a time frame of seconds, even milliseconds, officers must decide if the subject’s movement is indeed an attack, what type of attack it is, and what defensive tactic is appropriate – all in advance of executing the tactic in such a way to control the situation with minimal risk to all parties.

Rapid selection and execution of an appropriate defensive tactic relies upon the perceptual-cognitive sub-skill of Attack Recognition – which is the target skill for this part-task training application that can be used on a computer, tablet, or smart phone.

Applying EPA, an expert-novice study will be conducted in order to 1) verify that attack recognition is a characteristic of expert performers, and 2) define the bounds of expert perceptual advantage in ways that guide the training design.

Research Design

As in any expert-novice design, it is a challenge to define experts. In this study, expertise is characterized by relatively recent training in defensive tactics and/or assignments that require regular use of defensive tactics. Performance-specific expertise, then, is not directly related to rank or years of service.

Use the questionnaire to establish expert novice groups

Use the testing tool to find if it differentiates between groups

Manipulate variables (e.g., occlusion) to reveal maximum expert advantage on the testing tool

Make recommendations for instructional design of video-occlusion app
Research Questions

The aim of this cross-disciplinary study is to inform both domains of expertise and instructional design. Therefore, my research questions are driven by instructional design to inform training systems design features. Hence, the following are the instructional design questions:

1. What is the minimum number of occlusion conditions when designing temporal occlusion video simulation for training? What is the window of expert advantage?
2. Should we provide learners with a tutorial or direct instruction on where to look at subject’s body?

To achieve this goal, I will set up experiments that examine the underlying mechanisms of expert performance. As such, I propose the following questions:

1. How good are expert and novice groups at distinguishing and predicting an impending attack?
   a. How are the expert, near expert, and novice groups different at various temporal occlusion points?
   b. How are the three groups different at recognizing a no-attack experiment?
2. How are expert, near expert, and novice groups different at various spatial occlusion conditions that reveal where participants pick up anticipatory information?

Experiment 1: Differences in anticipation (temporal occlusion) across expertise levels

Experiment 2: Difference in gaze behavior (spatial occlusion) across expertise levels

Insights Gained

For decades, researchers have used occlusion methods to reveal if experts have perceptual advantages in high-speed decision-making. In addition, temporal and spatial occlusion has been used to identify when and where experts perceive cues in the movements of an opponent.

When occlusion methods are repurposed as mediated, part-task training programs, instructional designers need to make a plethora of decisions about the stimulus materials (video versus virtual reality) and features of the occlusion tasks. These include how often and when to occlude videos. Designers also need to decide if and where to guide trainees visual attention.

Eventually, a menu of recommendations should be available to teachers, trainers, and instructional designers to guide the design and implementation of training programs to improve the speed and accuracy of high-speed decision-making in domains such as law enforcement, surgery, emergency response, and vehicle operation.