Searching for threat: factors determining performance during CCTV monitoring

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Abstract

Monitoring closed-circuit television (CCTV) for security purposes is a task requiring sustained attention and the processing of many complex, constantly changing visual elements. Studies of performance in such tasks reveal a high level of workload and rapid loss of performance as workload is increased. Similarly, laboratory based experimental paradigms suggest that performance in CCTV monitoring is extremely dependent on the complexity and number of video screens monitored. We suggest that measuring eye movements during CCTV monitoring might provide a novel and rich source of data to illuminate the question of how CCTV monitoring is performed. In the psychological literature, two influences on attention are traditionally considered: the ability of events in the world to capture our attention regardless of our current goals (stimulus-dependent salience) and the ability to direct our attention towards stimuli relevant to the task we are trying to perform (goal-based relevance). Stimulus-dependent salience and goal-based relevance together determine the human fixation priority assigned to scene locations (Fecteau and Munoz, 2006, TICS 10, 382-390). Tests of the stimulus-dependent salience component of this process tend to look for regions in the image that are consistently fixated and link this to the underlying image properties. However, when the task is common across observers, consistent fixation location can also indicate that that region has high goal-based relevance. By examining the eye movements of multiple expert observers, we may start to characterise features of the moving video stimulus that are predictive of events likely to be judged as suspicious.

Eye movements in the real world

Studies of naturalistic task performance have used eye movements as a measure of how attention moves around the visual field, or 'attentional deployment' (e.g. Hayhoe & Ballard, 2005; Land, 1999; Underwood, Chapman, Brocklehurst, Underwood, & Crundall, 2003; Findlay & Gilchrist, 2003). The way people use eye movements to do various everyday tasks has been investigated; including steering a racing car (Land & Tatler, 2001), hitting a cricket ball (Land & MacLeod, 2000), making tea (Land, Mennie, & Rusted, 1999) and sandwiches (Hayhoe, 2000). The

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