

Expertise and strategies in the detection of firearms via CCTV

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Abstract

Illicit firearms are frequently carried on the person, on the streets of the UK, in both concealed and unconcealed guises. The UK's considerable CCTV infrastructure offers a suitably distributed network of sensors for the detection of these firearms. However, the capacity of CCTV operators for surveillance is limited. The present research aimed to make explicit the expertise of CCTV operators in the detection of firearms. The overall intention is to inform the design of image processing algorithms which would automate the monitoring of CCTV cameras for firearms. The abilities of CCTV operators (n = 16) and lay people (n = 16) to detect concealed and unconcealed firearms in staged CCTV footage were quantified within a signal detection framework. The visual search strategies employed by each participant were elicited by self-report and indexed against efficacy. Search strategies were also verified empirically in a separate eye-tracking study (n = 24). CCTV operators had greater sensitivity to concealed firearms than lay people, dependent upon type of firearm and camera angle. The results of the study are discussed in terms of effective monitoring strategies, applicability to real-life CCTV monitoring, automatic firearm detection algorithms, and future research with real-life CCTV footage of gun crime.

Introduction

There is evidence that firearms are frequently carried in public places, in both concealed and unconcealed guises; the UK's considerable CCTV infrastructure offers a means by which such firearms can be detected (Darker, Gale, Ward, & Blechko, 2007; Darker, Gale, Ward, Blechko, & Purdy, 2007). CCTV operators spot a majority of incidents directly, through proactive surveillance (Gill et al., 2005). Thus, a key element in the efficacy of CCTV as a crime reduction tool is the skill of the CCTV operator. Therefore, it is desirable to make explicit the nature of expertise in the detection of mal-intent via CCTV. This information might then be used in the design of automatic image processing algorithms for the detection of firearms via CCTV.

Prior research has concentrated on the detection of the precursors of overtly violent behaviour, via CCTV (Troscianko, Holmes, & Stillman, 2004). However, the