EXPLORING ESSENTIAL SKILLS OF CCTV OPERATORS: THE ROLE OF SENSITIVITY TO NON-VERBAL CUES

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The aim of the present research is to investigate the importance of individual differences in the recognition of emotional state from non-verbal, visual cues in relation to the work of CCTV operators. An experiment was conducted to determine whether the detection of a gun carrier can be predicted on the basis of an observer's ability to recognize emotion conveyed by non-verbal, visual cues. There was a relationship between the emotional state reported by an individual whilst carrying a firearm and the extent to which an observer was ability to determine whether or not this individual was carrying a gun. It was also found that observers with a high ability to recognize emotion from facial expressions were able to spot a gun carrier more accurately than observers with a low ability in this respect. This small-scale pilot study requires replication with a larger number of participants and real CCTV images.

Introduction

The selection of good Closed Circuit Television (CCTV) operators is essential for effective CCTV system functioning (Donald, 1999). Through dialogue with operators and their managers in several control rooms in the UK it has been indicated that good performance amongst CCTV operators depends not only on proper training but also on the 'innate abilities' of candidates. However, there is little empirical research to support this assertion.

Previous research involving those convicted under the UK firearms act indicates that carrying a firearm evokes an emotional response in an offender (Hales, Lewis, and Silverstone, 2006). It is possible that the ability of operators to perceive this emotional response will predict their performance in spotting armed criminals. This ability might be based on body language analysis and particularly on an understanding of emotional state derived from non-verbal, visual cues.

The ability to recognize accurately emotional expressions transmitted by others through their non-verbal behaviour (e.g. from facial expressions and gait) has been widely studied in experimental psychology (e.g. Ekman, and Friesen, 1969; Montepare, Goldstein, and Clausen, 1987; Atkinson, Dittrich, Gemmell, A.J., Young, 2004). However, little applied research has been done on this topic with respect to the work of CCTV operators. The aim of the present research is to investigate the importance of individual differences in sensitivity to non-verbal cues and the ability to recognize emotions from these cues for a better understanding of the performance of CCTV operators. An experiment has been conducted to determine whether the detection of a gun carrier can be predicted on the basis of an observer's ability to recognise emotions from non-verbal, visual cues. Specifically, it is hypothesised that those who are better able to recognise emotional state on the basis of facial and bodily cues will be better able to detect concealed and unconcealed firearms in CCTV footage

Experiment

The experiment was designed to examine the relationship between an observer's sensitivity to non-verbal, visual cues relating to emotional state and their ability to detect a gun carrier. Further, the possible relationship between the self-reported emotional state scores of gun-carriers, and the ability of observers to recognize that gun carrier was investigated.

Method

Firstly, idealised, 'staged' CCTV video footage of twelve males, each carrying either a firearm or a matched innocuous object, was generated. The firearm and matched innocuous objects were either carried in plain view or they were carried concealed on the person (Figure 1). Whilst the footage was filmed, the potentially differing influences on affect of carrying a firearm and carrying an innocuous object were assessed. Seventy-two clips of people carrying firearms were and 216 clips of people carrying an innocuous object were generated (half unconcealed and half concealed).For each type of object (firearm or innocuous) half the clips featured an unconcealed object and half featured a concealed object. See Darker, Gale, and Blechko (forthcoming) for a complete description of this aspect of the experiment.

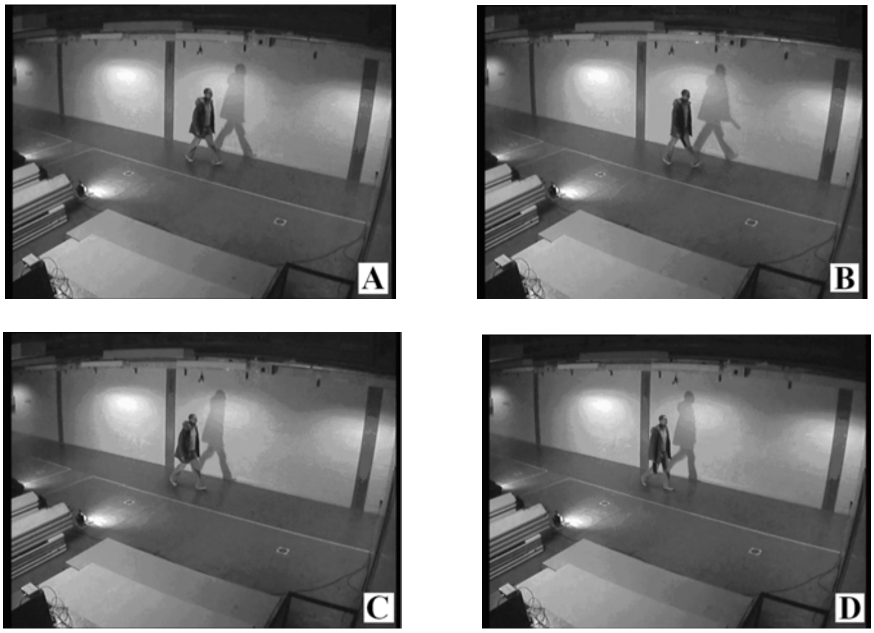

Figure 1. Examples of still images of the idealised footage (A –walking with a concealed firearm; B – walking with an unconcealed firearm; C – walking with a concealed two-litre bottle; D – walking with an unconcealed two-litre bottle)

Subsequently, eight staff members from Loughborough University (6 female and 2 male) volunteered to participate in the study relating to an observer's ability to detect a person who is carrying a firearm. The experiment took place over two sessions. In the first, participants were administered the Face and Body PONS test, which is a shortened version of the full PONS test (Rosenthal, Hall, DiMatteo, Rogers, and Archer, 1979). The Face and Body PONS test measures the ability to decode non-verbal cues expressed by the face and body. The test consists of video fragments of a young woman acting in different naturalistic, emotional situations. In the present experiment, all audio content was excluded. After viewing each video fragment the participants (i.e. 'observers') were required to make a choice between one of two descriptions relating to the emotive content of the clip. Participants were asked to select the description which best described the situation acted out in the fragment. Then each participant viewed the idealized footage of people carrying either a firearm or an innocuous object. In the second part of the experiment participants viewed each clip of idealised footage of people carrying either a firearm or an innocuous object and, after each clip, rated whether or not they thought the person in the clip was carrying a firearm. This is referred to as the Gun Carrier Detection (GCD) task.

Results

Performance on the PONS test was analysed against two measures: Face PONS test score; Body PONS test score. These scores were used to split the participants into two groups for each of the measures, based on a median split. Thus, for the Face PONS scores a high sensitivity (n = 4) and a low sensitivity (n = 4) group were formed. Similarly, for the Body PONS scores a high sensitivity (n = 4) and a low sensitivity (n = 4) group were formed.

Performance on the GCD task was measured in terms of the percentage of true positives (hits: the percentage of times a gun is detected when it is present), false positives (false alarms: the percentage of times a gun was reported, when in fact no gun was present), and the sensitivity parameter d_a derived from a Signal Detection Theory (SDT) based analysis. On this basis, sensitivity (d_a) represents the ability of the observer's sensory process to discriminate a target (the gun) from noise (the innocuous object). (For a review of SDT see Harvey, 2001).

In order to analyze the influence of concealment and sensitivity to facial and bodily non-verbal cues on the performance of observers two, 2 x 2 mixed ANOVAs were conducted: concealment (concealed, unconcealed) (within subjects) x PONS face group (high sensitivity, low sensitivity) (between subjects); concealment (concealed, unconcealed) (within subjects) x PONS body group (high sensitivity, low sensitivity) (between subjects).

The analysis showed a significant main effect for concealment on all dependent variables in both analyses. Participants performed significantly better in the unconcealed condition than in the concealed condition. There was a significant interaction effect found for the Face PONS score and Concealment on d_a scores ($F_{(1,6)} = 7.391$, $p = 0.035$). The group of observers with a high score on the Face PONS test had higher recognition sensitivity than the observers with a low score on the Face PONS test, but this effect was found only in the unconcealed condition. There was no significant effect of Body PONS test on any of the dependent variables, or other main or interaction effects.

A Spearman rank correlation test was conducted to explore the relationship between the ability of observers to recognize correctly a gun carrier and the emotional state scores reported by gun carriers whilst carrying a gun (see Darker *et al.*, forthcoming). The results of the test (Figure 2) showed that there was a positive correlation between the ranked Dysphoria (MAACL-R , Lubin and Zuckerman, 1999) scores of gun carriers and the ranked number of times the actor was correctly identified as a gun carrier (rho = 0.586, n =12, p = 0.045, two-tailed).

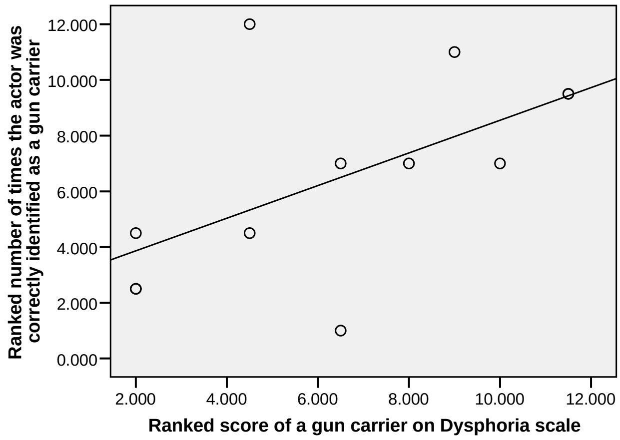

Figure 2. Correlation between the ranked score of a gun carrier on the Dysphoria scale and the ranked number of times the participants was correctly identified as a gun carrier in the Gun Carrier Detection task.

The current experiment revealed that observers' performance was associated with more true positives and fewer false positives when the object (firearm or innocuous) was in view, compared to when it was concealed. In contrast to those in the low sensitivity group for the Face PONS score, observers in the high sensitivity group for the Face PONS score performed significantly better in the detection of a gun carrier than other observers when the gun or innocuous object was not hidden. However, there were no significant differences between these groups when the objects were concealed. The Body PONS score did not influence gun detection performance.

General discussion

Prior research indicates that firearms induce an emotional response in the bearer and that an observer can detect this affect through non-verbal, visual cues conveyed by the face and body of the person expressing the affect. Therefore, it was hypothesised that those who are better able to recognise emotional state on the basis of facial and bodily non-verbal, visual cues will be better able to detect concealed and unconcealed firearms in CCTV footage.

The results of the current study showed that those who are more sensitive to emotional cues conveyed by the face are better able to detect an unconcealed firearm, whilst it appears that differing sensitivities to bodily cues did not influence gun detection performance. Thus, it might be argued that non-verbal, emotional cues conveyed by the face are most useful in detecting the emotion evoked in a gun carrier by the act of carrying a gun. However, the ability to detect a concealed gun was not influenced by sensitivity to either facial or bodily non-verbal emotional cues. Thus, it is possible that the ability to detect a gun amongst those with high sensitivity to facial, non-verbal emotional cues is not subserved by an ability to decode such cues. However, performance on the unconcealed was at base level, consequently the true significance of this result remains obscured. There is further evidence that the ability to detect a gun carrier is related to the ability to decode visual, emotional cues. Those gun carriers who reported more negative affect on carrying a gun were most likely to be successfully recognised as carrying a gun.

Thus, the present study provides an initial indication that visual, emotional cues conveyed by the face of a person who is carrying a gun can aid in the detection of the gun by a third party observer such as a CCTV operator. Future work will build on this small-scale pilot study to quantify the gun detection abilities of CCTV operators and lay people in relation to their abilities to decode non-verbal, visual emotional cues conveyed by the face and body. It is intended that this work will help inform policy and practice with regard to the recruitment of CCTV operators and the detection of firearms via CCTV.

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