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The Detection of People Carrying Concealed Firearms, Via CCTV: Do Their Emotions Give Them Away?

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Abstract

Illegal gun possession is an increasing problem in the UK. At the same time the UK has a massive CCTV deployment. Individuals can detect the emotional state of people shown in image sequences. Additionally, firearms are known to elicit certain emotional states in bystanders. When surveillance targets are carrying a concealed firearm, they may be more detectable for CCTV operators, who judge monitoring staged CCTV footage. Thirty-one participants viewed 24 mock CCTV clips of individuals walking. Half of the clips featured a concealed firearm; the other half featured a concealed, innocuous object. There were two conditions: Firearm and Innocuous Object. The surveillance targets were carrying a concealed firearm or a concealed, innocuous object. The present study showed that untrained observers are able to differentiate between the two conditions by attributing different moods to those featured in each. However, their estimation of mood was dissimilar to the mood reported by those featured in the clips. Furthermore, observers' non-verbal sensitivity and their ability to recognize the mood of carriers showed little relationship. These issues are discussed with regard to the visual cues associated with the mood recognition task.

Introduction

A person's emotional state can be conveyed through their non-verbal behaviour, which in turn can be picked up and interpreted by an observer. The ability to interpret non-verbal behaviour can help observers to recognize the emotional states of others through observation of non-verbal cues that vary from person to person. (Hall, 2001) and has been widely studied (e.g. Ekman and Friesen, 1969; Atkinson et al., 2004). Although the interpretation of the intentions of others through non-verbal behaviour might be a key element in the surveillance work of a CCTV operator, the issues surrounding the ability to decode emotional state through observation of non-verbal cues have not yet been investigated in the context of CCTV surveillance. It is possible that firearms might elicit specific, aggression-related emotional states in their bearers (Klimesnith 2006). Thus, the present study investigated the abilities of observers to read the emotional states of people viewed via CCTV, some of these people were bearing a concealed firearm and were known to have felt more aggressive whilst carrying the firearm. The following research questions were formulated:

1. Is it possible to differentiate between surveillance targets when they are carrying a concealed firearm and when they are carrying a concealed innocuous object, in mock CCTV footage, based on their estimation of the surveillance target's mood state? (Mood Detection Task: MDT).
2. Whether or not the decoding ability (i.e. sensitivity to bodily and facial expressions) of observers was related to their performance on MDT.

Method

Participants

Thirty-one undergraduates and postgraduates students from Loughborough University (20 male; age range: 20 - 35 years; M = 25.2, SD = 4.7). None of the participants had previous experience with surveillance work or in spotting criminal behaviour in general.

Procedure

1. Mock CCTV footage. In total 144 video clips with 12 different surveillance targets in two conditions (concealed firearm present; concealed innocuous object present ).
2. Mood Detection Task watching a surveillance target walk back and forth three times in mock CCTV footage. MAACL-R questionnaire afterwards to record how participants thought the person in those video clips was feeling.

Results

1. Differentiation between carriers of a concealed firearm and carriers of a concealed innocuous object

Repeated measures ANOVA, with Condition (firearm versus innocuous object) as the factor, showed no significant effect of Condition on the perceived level of anxiety (F(1,30) = 9.016, p = 0.05) and positive affect (F(1,30) = 6.08, p = 0.02) in the surveillance target. However, there were significant differences in mean scores that show the observers rated the mood of surveillance target’s in the firearm condition as more positive than the mood of surveillance target’s in the innocuous object condition (see Figure 3).

2. Performance on MDT

In the condition featuring the neutral object, the condition showed a significant effect of Condition on performance of observers on MTD (F (1,30) = 21.877, p = 0.00, for Positive affect; F (1,30) = 23.630, p = 0.00, for Depression; F (1,30) = 46.852, p = 0.00; for Hostility; F (1,30) = 197.849, p = 0.00, for Sensation Seeking). In the Match condition, the differences in mean scores of observers and actors' scores were significantly lower than these differences in the Test condition (see Figure 4). This means that the performance on MDT was more accurate when the surveillance targets were carrying an innocuous object.

3. Relationship between the measures of decoding ability (i.e. sensitivity to bodily and facial expressions) and the performance on MDT

The partial correlation analysis was used, in order to control for trait scores of observers.

Significant positive correlation between PONS total test and the observers peer-ratings on Sensation Seeking scale in both, Match and Test conditions (r = .651, n = 31, p = 0.005 and r = .697, n = 31, p = 0.002, respectively).

Significant positive correlation between PONS Face test and the performance on MDT related to Anxiety scale in Match condition (r = .487, n = 31, p = 0.047). No other correlations between the scores of these two tests were found.

Conclusion 1 & 2: The observers were able to discriminate between the emotional states of surveillance targets when they were carrying a firearm and when they were carrying an innocuous object. In general the observers detected the mood of surveillance targets better when the targets were carrying an innocuous object. When surveillance targets were carrying a firearm, their mood, associated with positive affective state was more accurately detected by observers than their mood, associated with other (negative) states of the MAACL-R.

General Conclusion

The present study showed that untrained observers are able to differentiate between the images of people walking with or without a concealed firearm, based on the emotional state that they attribute to them. Although the observers could not infer the correct self-estimated moods of the surveillance targets, they were more accurate in detection of surveillance targets’ mood when the targets were carrying a concealed innocuous object. Questions arise regarding the cues being used by observers and the cues displayed by surveillance targets; for instance, which produced the miscalculations? Such questions will be investigated in future studies. Future experiments will also explore the relationship between sensitivity to non-verbal cues and ability to detect a gun carrier. The visual cues used in attempting to decode the non-verbal cues displayed by carriers of concealed guns might be inferred by means of a questionnaire and determined empirically by eye-tracking.

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