EVALUATION OF THREAT BY POLICE OFFICERS: INITIAL FINDINGS

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Police officers’ threat perception of static images was examined using images reflecting the range of five threat categories on which police officers are trained. Thirteen experienced officers from a police departments in the southeastern United States participated in this study. Officers rated their perceived threat level for 110 images that were presented to them on a laptop computer. Each of these images was rated twice by each officer. Officers used all five categories to rate the stimuli, and their responses to the extremes (images rated as 1 or 5) were faster than responses to more ambiguous stimuli in the other categories. These results were generally consistent with predictions based on Fuzzy Signal Detection Theory. Further studies will evaluate performance with these images in the context of a signal detection task. Once fully developed, this tool could be used to evaluate new recruits’ decision-making process before given the green light to carry a badge. These assessments could also be used as a modified training tool for experienced officers if the stimuli were to be placed in a semi-immersive environment.

INTRODUCTION

A major task Police Officers confront on a daily basis is situation assessment and subsequent determination of the level of threat posed to either themselves and/or to the public they are sworn to protect. There are situations in which they may perceive no threat or other situations in which they may perceive total threat. These perceptions will elicit different responses based on the officer’s training and the protocol they were instructed to follow given different threat levels. The way an officer perceives a situation’s threat level will determine the manner in which he or she will react, as well as how quickly they will make a decision. For instance, an individual running toward an officer, or an individual reaching into his pocket, represents a rather ambiguous situation the officer must assess accurately in a short period of time. The response to a determined threat level can range from little to no reaction (visual acknowledgement or complete dismissal) to total threat (use of deadly force to subdue the threat). This range of response makes it imperative that the officer correctly identifies the situation’s appropriate threat level. To be considered a ‘successful’ response, the threat level must not greatly contradict the officer’s response. This decision-making task can be conducted many times over the course of a work-shift depending on the officers’ assignment and work-environment. The consequences of their decision could mean the difference between life and death for them, the citizens of the community or the suspect in question.

In spite of the national and international importance of threat detection in law enforcement, little systematic research into the perceptual
processes underlying these decisions has been done. This study represents an initial effort to develop threat stimuli for such a systematic research. Thus, we provided officers with images sampled from the range of threatening situations they may face daily in order to examine how they categorized these events and whether their response times to those events varied according to threat rating. Finally, we also sought to determine the degree to which officers were consistent in their ratings of images. Each officer therefore experienced each image two times.

Police officers typically evaluate threat level of events using five categories, with the lowest (1) being no threat and the highest (5) being ‘total threat’ (i.e., life threatening). Threat level 1 corresponds to officer presence and often requires no interaction with the subject or subjects. Threat level 2 would require verbal commands and possibly non-aggressive physical touch leading subjects to another location. Threat level 3 would require controlling force with moderate physical exertion. Threat level 4 would often require incapacitating force endangering the life of the suspect and police officer. Threat level 5 often could require deadly force at the discretion of the police officer. That is, police officers in threat level 5 are not required to use deadly force, although such a response is justified. We adopted this threat level scheme for this study, since it accords with both the training police receive and the way they actually assess events as they occur in the course of a shift.

This study aims to develop and validate stimuli that could potentially investigate what police officers perceive as threat and the specific threat level they assign to each situation. With validated stimuli, many different avenues for research can be explored, such as police stress, vigilance in task allocation, and workload sensitivity. Detailed assessments could be further used to evaluate new recruits decision-making process before they are given the green light to carry a badge. These assessments could also be used as a modified training tool for experienced officers if the stimuli were to be placed in a semi-immersive environment. Finally, the results of the current study can be used to derive mapping functions for use in Fuzzy Signal Detection Analyses (Parasuraman, Masalonis, & Hancock, 2000), which will permit a more accurate assessment of threat detection performance in complex real-world situations that routinely face law enforcement professionals.

**METHOD**

Thirteen police officers were chosen at random from a police department from the southeastern United States. Police officers volunteered their time and were not offered any reward or incentive. Each participant signed an informed consent and was given a debriefing form at the conclusion of the session. There were 11 male and 2 female participants. Their ranks were: officer (10), sergeant (1), and lieutenant (2). They were all assigned to road patrol with several officers also assigned to specialized units (S.W.A.T. and K9 division). The average age of the officers was 32 (SD=7). The average years of service were 6.8 (SD=5.7). The officers were either assigned to mid shift (3 P.M.-11 P.M.) or night shift (11 P.M.-7 A.M.).

Each participant was asked to read an informed consent and sign the second page if they agreed to the provisions provided within. Participants then completed a short demographic questionnaire. The experiment was presented to each officer on a laptop computer. The participants read a series of directions presented on the computer prior to judging the stimuli. There were 110 different pictures presented which depicted scenes that are encountered by police officers. The pictures were taken from a several databases of police interactions, all of real world interactions depicting actual events (as shown in Figures 1 and 2). Each image was presented twice during the session. The order of presentation was randomized, with the restriction that the two presentations of an image
never occurred on consecutive trials. Each stimulus presentation was 3000 ms in duration. The police officers were instructed to respond using keys 1, 2, 3, 4, and 5 (1- no threat, 3-between no threat and total threat, and 5- total threat). Once the police officer responded, the next picture was presented.

**RESULTS**

To test for reliability between the officers’ two ratings for each picture, a series of bivariate correlations were computed for all 110 stimuli. The average correlation between image presentations was .70, indicating a reasonable degree of consistency in categorization of images by the officers.

For each of the 110 stimuli, the mean response was computed. There were a total of 21 level 1 images across the participants, 32 level 2 images, 30 level 3 images, 16 level 4 images, and 11 level 5 images. Within each category of responses, the median response times were then calculated for each officer, and the mean of the median response times was computed across all 13 participants. The mean response time scores are shown in Table 1.

Table 1 – Category of threat, number of images associated with each category and the mean median response.

<table>
<thead>
<tr>
<th>Threat Category</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Images</td>
<td>21</td>
<td>32</td>
<td>30</td>
<td>16</td>
<td>11</td>
<td>110</td>
</tr>
<tr>
<td>Response Time (ms)</td>
<td>606.43</td>
<td>711.88</td>
<td>729.15</td>
<td>825.72</td>
<td>563.18</td>
<td>698.14</td>
</tr>
<tr>
<td>SD</td>
<td>131.08</td>
<td>219.80</td>
<td>207.81</td>
<td>444.01</td>
<td>95.31</td>
<td>250.02</td>
</tr>
</tbody>
</table>

An ANOVA (threat level X reaction time) indicated a significant main effect for threat category, $F(4, 105) = 2.73, \eta^2 = .762, p = .026$. Post hoc pair-wise comparisons revealed that response times to stimuli categorized at level 4 ($M = 825.72$, $SD = 444.01$) were significantly slower than those to images categorized as category 1 ($M = 606.43$, $SD = 131.08$). Response times to images categorized at threat level category 4 were also significantly slower than those to stimuli categorized at level 5 ($M = 563.18$, $SD = 95.31$).
DISCUSSION

In general, the results of this study accorded with expectations. Officers used all five categories to rate the stimuli, and their responses to the extremes were faster than responses to more ambiguous stimuli in the middle categories (2-4). The latter results accord with those reported by a prior experiment in which observers were required to rate the degree to which a stimulus was a signal on a scale from 1 to 7 (Stafford, Szalma, Hancock, & Mouloua, 2003). In that study, Stafford et al. (2003) observed that responses were slower to stimuli in the middle categories, where the level of the stimulus is uncertain for the participant. The response time effects observed in both experiments are in agreement with the tenets of Fuzzy Signal Detection Theory (FSDT; Hancock, Masalonis, & Parasuraman, 2000; Parasuraman, Masalonis, & Hancock, 2000). FSDT represents a fusion of fuzzy set theory and signal detection theory (SDT), in which the mutually exclusive categories used in SDT (i.e., signal, non-signal) are replaced by categories in which joint membership is possible.

This model allows for the quantification of real-world stimuli that possess properties of signal and non-signal to various degrees. An implication of FSDT is that the middle of the stimulus dimension should be the point of greatest uncertainty, since at that point the stimulus possesses the properties of both signal and non-signal to equal degrees. The preliminary results presented in our study are generally consistent with this notion. Subsequent research will validate use of these stimulus categories with a larger sample of officers for the purpose of employing these stimuli for experimentation using FSDT methodology. It is believed that FSDT will prove as a valuable tool in determining the threat level discriminations and responses as they relate to police officers decision making and execution of the correct responses.

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