Cognitive Basis for Expert and Superior Performance in Law Enforcement

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Introduction

Our aim was to objectively capture experts' superior performance on a complex representative task and examine the cognitive factors responsible for that superiority. We hypothesized that experts would aid their performance via the use of dynamic representations consistent with long term working memory theory (Ericsson & Kintsch, 1995).

Methods

Participants

Fourteen expert (e.g., S.W.A.T.-trained) and 14 rookie (academy trainees) law enforcement officers participated in this experiment.

Materials and Apparatus

A simulated task environment (STE) was developed specifically to assess participant performance on tasks representative of law enforcement. Participants interfaced with the STE via a modified blank firing F-92 Beretta handgun. LabVIEW and external video cameras were used to record participants' response, shot accuracy and latency.

Procedure

After a familiarization period and verbal report training, participants undertook 20 randomly presented test trials. Participants responded from a first-person perspective to semi-interactive, video simulations that included scenarios such as a domestic dispute, larceny, and hostage situation. Nine of the trials were "no-shoot" trials (i.e., lethal force was not required) and 11 were "shoot" trials. A trial ended when participants shot their weapon to avoid providing additional feedback. Participants were asked to talk aloud during each trial and give a retrospective verbal report (Ericsson & Simon, 1980) immediately after 10 of the trials (3 no shoot, 7 shoot).

Results & Conclusions

Stepwise discriminant function analyses were used to identify the most predictive shoot trials. One significant variate was observed (X^2 = 25.30, *df* = 3, *sig* = .000). The standardized canonical coefficients indicated that three scenarios, Blow Up (.684), School Hostage (.559), and Convenience Store (.572), contributed similarly to the skill model. The significant variate accounted for 64% of the variance in skill.

Table 1: Mean (SD) shot latency by skill group/level of success for all shoot/most predictive trials in seconds.

Group	All shoot trials	Convenience Store	Blow Up	School Hostage
Expert	50.77 (21.6) *(n = 14)*	37.50 (2.08) *(n = 14)*	38.11 (4.55) *(n = 14)*	39.10 (0.95) *(n = 14)*
Rookie	52.15 (21.4) *(n = 14)*	39.68 (0.19) *(n = 14)*	42.80 (2.86) *(n = 14)*	40.33 (0.51) *(n = 14)*
Success	*n/a*	35.85 (0.75) *(n = 8e, 0r)*	36.36 (3.21) *(n = 10e, 3r)*	38.96 (0.87) *(n = 13e. 1r*
Unsucc	*n/a*	39.69 (0.30) *(n = 6e, 14r)*	44.00 (0.03) *(n = 4e, 11r)*	40.47 (0.00) *(n = 1e, 13r)*

To reduce any confound from intra-group individual differences, skill groups were reclassified based on a within-task criterion (i.e., trial success) (see Table 1). Bonferroni-adjusted *t*-tests were performed on the preceding behavioral data (i.e., hand movement toward holster, hand on holster, un-holster, and aim) to determine the point of deviation in the participants' response that lead or did not lead to a successful outcome. The behavioral and verbal report data were then used to identify the cause of the deviation and alternative trajectory taken by each group.

Preliminary descriptive analyses of concurrent data suggest that successful participants generally perceived the threatening stimuli early and followed a course of action consistent with ordering the perpetrator to stand down. When behavior was non compliant and the situation continued to escalate, successful participants fired a shot. In contrast, unsuccessful participants either saw the threat early but did not pursue a similar course of action or saw the threat late and subsequently ordered participants to stand down. Both options, however, resulted in an unsuccessful outcome. The retrospective verbal report data indicated that successful participants attempted to predict the outcome prior to its occurrence based upon the evolving context and/or evaluated the negative outcome of the threat. The process data suggested that superior performers, particularly experts, had developed mechanisms consistent with Ericsson and Kintsch's (1995) long term working memory.

Acknowledgments

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References

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