

Feasibility of a Random-Action Target System for Enhancing Performance of Experienced Shooters in High-Pressure Scenarios

MARIANA CASTRO¹, ANDREAS STAMATIS^{1,2}, ALI BOOLANI^{3,4}, & MATTHEW LEE SMITH⁵

¹Health & Sport Sciences; University of Louisville; Louisville, KY

²Sports Medicine Institute; University of Louisville Health; Louisville, KY

³Human Performance and Nutrition Research Institute, Oklahoma State University, Stillwater, OK

⁴Physiology and Pharmacology, Oklahoma State University, Stillwater, OK

⁵School of Public Health, Texas A&M University, College Station, TX

Category: Undergraduate

Advisor / Mentor: Stamatis, Andreas (andreas.stamatis@louisville.edu)

ABSTRACT

Effective firearm performance demands accuracy and rapid decision-making, especially for law enforcement, competitive shooters, and military personnel. Traditional training often lacks real-world cognitive challenges, such as decision speed and response inhibition under pressure. This study addresses this gap by incorporating cognitive realism into firearm training to improve shooters' ability to manage the speed-accuracy trade-off (SAT), where balancing quick reactions with precision is critical to avoid errors in unpredictable scenarios. **PURPOSE:** To evaluate the feasibility of a non-anticipatory, random-action target system (RATS) by collecting preliminary data on its impact on shooting performance, focusing on accuracy, omission, and commission rates among experienced shooters. **METHODS:** A convenience sample of six male participants (ages 45-58) was recruited, including three retired police officers and three competitive shooters. Five were classified as advanced shooters, and one as intermediate. The RATS system presented randomized targets at varying positions, speeds, and exposure times. Participants used their own handguns and completed a three-round field trial. Trial 1 and 3 had 0.5-second target exposure, while Trial 2 extended exposure to 0.7 seconds. Wilcoxon sign-rank tests were performed to assess changes in accuracy, omission, and commission rates across the trials. Median values and interquartile ranges (IQR) were calculated, with statistical significance set at $p < 0.05$. **RESULTS:** A) Accuracy: Trial 1: Median = 41.1%, IQR = 30.8% to 63.8%; Trial 2: Median = 78.5%, IQR = 56.3% to 100.0%; and Trial 3: Median = 45.0%, IQR = 38.0% to 52.5%. B) Omission: Trial 1: Median = 2.4%, IQR = 0.0% to 7.3%; Trial 2: Median = 0.0%, IQR = 0.0% to 17.9%; and Trial 3: Median = 0.0%, IQR = 0.0% to 2.3%. C) Commission: Trial 1: Median = 61.0%, IQR = 38.9% to 69.2%; Trial 2: Median = 34.3%, IQR = 15.0% to 51.3%; and Trial 3: Median = 55.0%, IQR = 48.9% to 62.3%. **CONCLUSION:** The RATS shows potential as an innovative training tool for enhancing shooting performance in high-pressure, real-world scenarios. While the increase in accuracy and reduction in commission errors during extended target exposure (Trial 2) was expected, it highlights how longer target exposure naturally improves performance. However, the noteworthy finding is that most shooters showed improved accuracy and reduced errors between Trials 1 and 3, both of which had the same shorter target exposure times. This suggests that routine and consistent training with the RATS may help shooters better manage the SAT, even though the changes between Trials 1 and 3 were not statistically significant. Future research with larger, more diverse samples and longitudinal exposure is needed to confirm these findings and further explore RATS' long-term impact on tactical and competitive shooting performance.