Effect of Fatigue on Marksmanship

S&T Campaign: Human Sciences
Human Behavior

Matthew S. Tenan, (410) 278-5884
matthew.s.tenan.civ@mail.mil

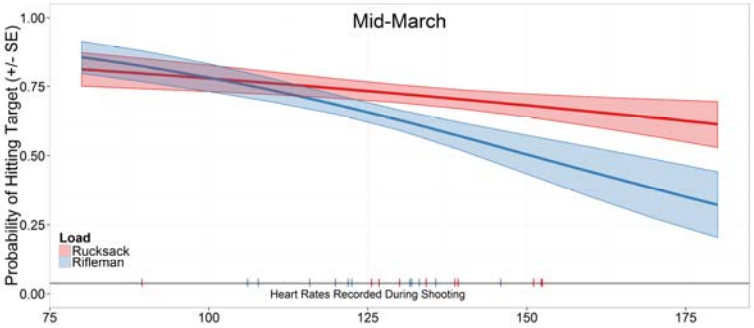
Research Objective

- Optimize Soldier performance in Army-relevant field scenarios
- Characterize physical effort and fatigue in the field
- Understand the effect of Soldier load on cognitive and physical performance to mitigate performance decrements in the field

A Soldier traversing the SPEAR networked cross country course at Aberdeen Proving Ground

Challenges

- Objectively quantifying physical and cognitive load in the field with high-time resolution metrics
- Synchronization and integration of multiple data sources on different time scales
- Early research suggests physical load has non-uniform effects on marksmanship



Probability of hitting the target after marching with different physical loads across a continuum of heart rates

ARL Facilities and Capabilities Available to Support Collaborative Research

- Soldier Performance and Equipment Advanced Research (SPEAR) at APG
  - Biomechanics Lab
    - Instrumented treadmill
    - Motion capture
  - Obstacle course
    - Time gate measures
    - Operational relevant tasks
  - Networked Cross country course
    - Wifi enabled
    - Pop up targets
- ARL Expertise
  - Physiological Assessment
  - Human Factors
  - Biomechanics
  - Motor Control
  - Shooting Performance
  - Vigilance and Response Inhibition
  - Data Science
- M-range (shooting range) at APG
  - Computer –driven targets
  - Accuracy and response time
- Command, Control, Communications, Intelligence, Surveillance, and Reconnaissance Lab (C4ISR) at APG
  - 8 whisper rooms
  - Networked

Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- Innovative physiologic techniques which increase temporal resolution of data
  - Hormones/Neurotransmitters
  - Cardiovascular metrics
  - Other suggested physiologic data types?
- Probabilistic simulation of data
- Real-time temporal integration of data
- Expertise in voice stress analysis or other non-invasive measures of stress/load
- Suggestions for innovative new research approaches to address stated research objectives

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