Changes in Cognitive Performance During Heavy Load Carriage

Next Generation Technology for Today's Warfighter — **November 2010**

At a glance

Objective

Infantrymen are physically fit and ready for combat; however, the question that bears exploration is "how does carrying heavy loads affect their cognitive readiness?" Infantrymen must observe, detect and collect vital information during combat. This study examined the relationship between heavy load carriage and warfighter cognitive performance.

Method

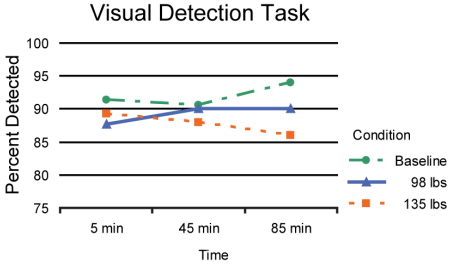
- 29 Marines recruited from SOI, Camp Pendleton, CA
- Marched 2 hours at 2 mph each session
- Load carriage: 0, 98 or 135 lbs over three consecutive days, counterbalanced
- Measured detection and identification of hostile and friendly targets
- Recall of orders and location of mission-critical landmarks
- Periodic assessment of working memory
- Subjective scales: NASA TLX, RPE, CALM
- Measured $V0_2$, heart rate, and gaze location

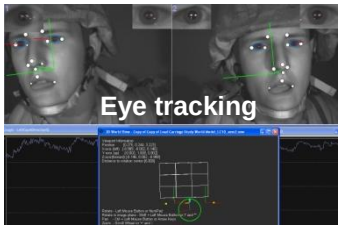
Results

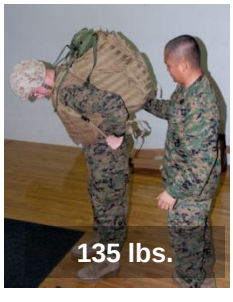
- At 98 lbs, a reduction in the detection of stimuli; recalled fewer orders and reduced spatial memory performance.
- At 135 lbs, larger performance decrements with increase over time; evidence of perceptual narrowing.

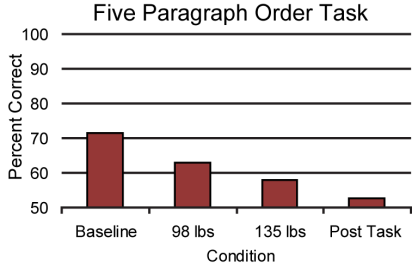
Post march performance

- Post session test administered following 5 minutes of rest to determine cognitive recovery after removing the load.
- Detection performance did not return to baseline.
- Recall of orders continued to decline.









Future Research

These results provide evidence that carrying heavy loads has an adverse effect on the cognitive skills needed by the infantryman. Additional variables encountered in the operational environment (e.g., terrain, grade, heat) may add to this burden. We propose measuring cognitive performance in the field during a long distance training march to validate these results. Additional research is needed to provide a clearer picture of the effects of load carriage and recovery on cognitive performance.

Point of Contact
David A. Kobus, PhD., CPE
Pacific Science & Engineering
858.535.1661
davidkobus@pacific-science.com

Kobus, D. A., Brown, C. M., Wu, L., Robusto, K., & Bartlett, J. (2010). *Cognitive performance and physiological changes under heavy load carriage* (Tech Report No. 10-12). San Diego, CA: Pacific Science & Engineering Group.