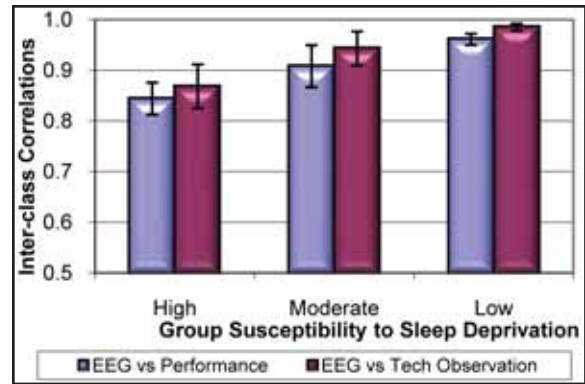
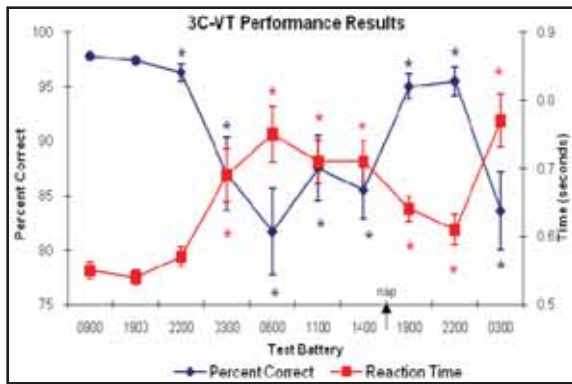
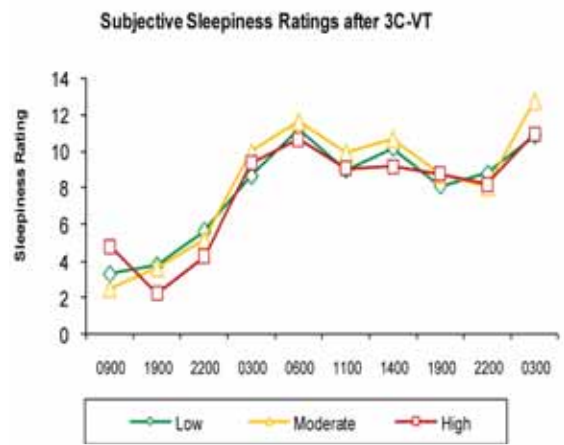
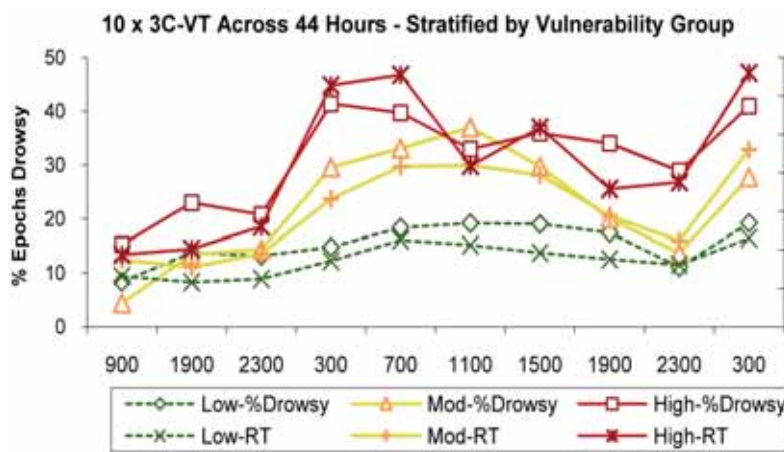


Identification of Individuals Most Susceptible to Sleep Deprivation

This investigation validated the use of the Alertness and Memory Profiler and B-Alert algorithms in objective measurements of drowsiness and the capability to identify those most susceptible to acute sleep deprivation. In this study 24 college-age healthy subjects were tested repeatedly during 44-hours of prolonged sleep deprivation to create changes in the level of alertness that permitted within-subject comparisons of alertness.



The graphs above show that percent correct and reaction time are inversely related measures of the impact of continuous sleep deprivation. The performance measures were very responsive to the 40-minute nap that was provided after 32 hours of sleep deprivation (at 1600 hours). Performance measures were independently used in a cluster analysis to categorize individuals into three groups based on susceptibility to sleep deprivation. The graph in the upper right shows the mean + SE of the canonical correlations between the B-Alert EEG drowsy classifications compared to performance measures (reaction time and percent correct) and technician-observed signs of drowsiness (eye closures, head nods) across the 10 time points. In the graph to the lower left, the percentage of epochs classified as drowsy are plotted with the associated reaction times (RT) for the three susceptibility groups. Note how well both measures relate across time for the three groups. The graph to the lower right shows that there was no difference in perceived sleepiness across the three susceptibility groups even though their performance was dramatically different.



These results indicate the B-Alert algorithms were capable of identifying fatigue resulting from a lack of sleep that leads to poor decision making. The combination of the B-Alert classifications and neuro-behavioral measures were demonstrated to be capable of identifying individuals whose performance is most susceptible to sleep deprivation. The fact that the subjective measures of sleepiness did not distinguish between the groups suggests that the subjects' perception of their own level of fatigue did not correspond to the objective measures.

Berka, C., Levendowski, D. et al. (2005). EEG Quantification of Alertness: Methods for Early Identification of Individuals Most Susceptible to Sleep Deprivation. Proceedings of SPIE Defense and Security Symposium, Biomonitoring for Physiological and Cognitive Performance during Military Operations. Orlando, FL, SPIE: The International Society for Optical Engineering.