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Cognitive Ergonomics and Electrophysiological Measures of Human Attention and Performance

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Abstract

In the design of complex systems, the accurate measure and prediction of human operator workload can be critical. If a genuine human-system interface is what is desired, the system components must have the capability to "detect" system state and adapt accordingly. EEG is perhaps the most accurate means available to directly measure changes in neural activity. Until now, use of EEG has required carefully controlled conditions, extensive set-up time and in-depth knowledge for operation and interpretation. New non-conductive-gel electrodes have been created by several groups. These systems are "pull-on", like a bathing cap. Recording systems and analytic techniques have also become more advanced. Further, human eye tracking technology has experienced significant improvement in recent years in such critical areas as sampling. To date, many eye activity behaviors are correlated with visual and cognitive demands of various tasks. What is lacking in the current body of literature are real time models of human operator state that can be integrated into the system functioning. With input concerning operator state available to an adaptive system, the task itself could be modified to account for operator fatigue, attentional state, and other performance characteristics of interest.

Keywords (12 font)
Cognition, Attention, Electrophysiological Measures, Human Factors

Biography
Bradley Chase, PhD, MPH, CPE is an Associate Professor of Industrial & Systems Engineering at the University of San Diego. Dr. Chase heads the Ergonomics Lab and in addition to conducting corporate training in Lean Six Sigma and Industrial Ergonomics, conducts research in Cognitive and Industrial Ergonomics.