Examining methods to induce cognitive fatigue

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Cognitive fatigue is important to user task productivity and worker safety in critical occupations because it may cause exhaustion and difficulty executing mental tasks leading to increased errors and job related injuries. Activities that require sustained focused attention over time (i.e. vigilance) increase stress and induce cognitive fatigue. In careers where safety is critical, such as aviation, homeland security, and medicine, these errors can lead to serious injury or even death.   Therefore, studying this phenomenon is crucial for findings ways to ameliorate these deleterious effects. In order to study cognitive fatigue effects in a laboratory setting researchers need to find effective tasks to induce fatigue. Studies that fail to do so may suffer ceiling effects as participants may not arrive to the study fatigued. Three methods shown to be stressful in the literature, a 15-minute break, a 15-minute vigilance task, and a 30-minute vigilance task were used to induce laboratory fatigue. These three methods were compared to determine their effectiveness of inducing fatigue. Physiological fatigue was determined using ECG, subjective fatigue was determined using self-report stress, task engagement, and anxiety, and cognitive fatigue was determined using performance on a cognitive test designed to measure executive functioning. It was hypothesized that a 30-minute vigilance task would be most effective at inducing fatigue, as errors during vigilance tasks tend to increase over time on watch. Overall self-reported stress and fatigue was rated high in both vigilance tasks, but only the 30-minute task induced cognitive fatigue (decreased performance pre to post on the cognitive task). This finding is unique in the literature, as previous research has tested fatigue effects using subjective measures and not cognitive ones. Researchers who are interested in studying the restoration of cognitive fatigue effects are recommended to use tasks that require sustained focused attention for at least 30-minutes. It is also recommended that future research investigate