Optimizing Performance Based Training: Monitoring the Flow of Cognitive Load based on Psychophysiological Measurements in a Fighter Cockpit Simulator

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ABSTRACT

Current training of fighter pilots is, almost without exception, designed for a fixed number of hours and on a specific time schedule. Performance Based Training is a training concept aimed at optimizing training, preferably in a personalized way. It is about preventing training/performance gaps beforehand, instead of solving them afterwards. Effective personalized learning assumes an optimal level of difficulty in the learning task provided. Therefore, an optimum load model is developed capable of classifying a pilot's cognitive load in real-time based on various cognitive load metrics. The study was set up to test electroencephalography (more specifically, the individual upper alpha band power and theta band power) as one of the cognitive load metrics of this model in a fighter cockpit environment. A total of four participants took part, all of whom were former F-16 pilots. Each of the participants performed three sessions with multiple runs. The cognitive load is expected to be higher during the first run (Retention Test) compared to the last run (Performance Test) within each session. While performance and subjective workload are respectively higher and lower during a Performance Test compared to a Retention Test, the cognitive load metric showed mixed results between both tests which could be attributed to high inter- and intra-individual differences.

***Keywords**: Performance Based Training, cognitive load, electroencephalography, fighter cockpit simulator, retention interval, tactical intercept*

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