EEG-BASED CLASSIFICATION OF "SKILLED" AND "UNSKILLED" CONDITIONS AS NAÏVE PARTICIPANTS PRACTICE A COGNITIVE-MOTOR TASK IN A LIFE BOAT SIMULATOR

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Purpose: Neural signals have the potential to provide information regarding a learner's task proficiency that performance measures alone cannot. The purpose of this study is to determine if neural signals obtained via electroencephalography (EEG) can be used to automatically classify different levels of task proficiency (e.g., unskilled, skilled) on a single-trial basis.

Methods: For this purpose, a virtual training environment that simulates a standard life boat will be used. Up to 15 naïve participants (i.e., no experience with driving boats in real or simulated environments) will complete several trials of a manoeuvering task while their neural activity is recorded via 64-channel EEG. Participants' performance for each trial will be scored according to a predefined rubric. This performance measure will be used to label trials as "skilled" or "unskilled". Automatic feature selection algorithms will be employed to identify attributes of the neural signals that allow the best discrimination between these conditions, and linear and nonlinear supervised learning algorithms will be used to automatically classify them on a single-trial basis.

Results: Data collection and analysis are ongoing.

Conclusion: In general, this work will add to the body of knowledge regarding user-state classification in complex task scenarios, and may lead to the development of passive brain-computer interface technologies to enhance simulation-based training programs.