

Assistive technology for the locked-in: a comparison of a brain-computer interface and an eye tracker

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The literature on brain-computer interfaces (BCIs) has often neglected aspects related to usability assessments. Eye trackers are widely used among patients with amyotrophic lateral sclerosis (ALS) and the benefits on the quality of life has already been shown. We compared the bit-rate, the usability, and the cognitive workload of a visual-P300-based BCI with the corresponding scores of an eye tracker, on 12 patients with motor impairments. Patients performed three internet tasks during three sessions with the BCI and the eye tracker. After each session questionnaires about usability (SUS) and cognitive workload (NASA-TLX) were administered. An analysis conducted by using the Wilcoxon signed-rank test showed that the eye tracker (Mdn = 12.72) has a higher information transfer rate than the BCI (Mdn = 9.04), that the scores of the SUS are higher for the eye tracker (Mdn = 80) than for the BCI (Mdn = 71.25), and that the cognitive workload is higher for the BCI (Mdn = 49.75) than for the eye tracker (Mdn = 33.53). Although BCIs can be useful for locked-in patients, BCIs based on the visual P300 with patients not completely locked-in are less useful, we suggest exploiting other modalities such as the auditory or other types of BCIs such as those based on classical conditioning.

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