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Impact of MI-BCI feedback for post-stroke and neurotypical people

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The efficiency of BCI in general and of BCI based post-stroke motor rehabilitation therapy, in particular, depends on the feedback that is provided [2,4]. Feedback arriving to the brain are either extrinsic (information originating from an external source, e.g., a screen or a person) or intrinsic (somatosensory sensations felt by the person during the training). Both types of feedback have proven efficient for healthy participants to control a BCI [3,7] and to promote functional recovery post-stroke [1,5].

Literature indicates that the type of feedback might have an impact on BCI efficiency in terms of performances. For example, an intrinsic somatosensory feedback might be more effective than an extrinsic visual feedback for post-stroke rehabilitation and for neurotypical persons in a multitasking context [3,6]. However, there are no information in the literature regarding the influence that feedback might have over long-term learning. There is also a gap in the literature regarding the potential impact of the profile of the participants, e.g., kinesthetic abilities, on the type of feedback to provide.

In this work our aim is to explore the impact of modality of feedback, as well as users' neurophysiological and psychological characteristics on user experience, BCI performances and neurophysiological markers. To do so, we analyzed the literature and implemented accordingly a MI-BCI with realistic visual and tactile feedback. We also designed protocols for which we plan to include forty neurotypical and post-stroke patients. Each of them will take part in 10 MI-BCI training sessions during about an 1 hour each. Training sessions will differ depending on the type of feedback which is provided, i.e., either a realistic visual feedback alone or the same visual feedback and a tactile feedback in addition.

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