

## What can we learn from user interviews in BCI sessions?

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*Introduction:* What factors contribute to the success of motor imagery training for novice users of EEG-based Brain-Computer Interfaces (BCI)? How do novice users experience and adapt to Kinesthetic Motor Imagery (KMI) training? One way to find out more is to ask the users themselves and to collect qualitative data with interviews during BCI sessions. However, the practice is not common, although it tends to be more democratized in recent literature, mostly with patients [1–10].

*Methods:* Semi-structured interviews were conducted at the end of each of three BCI training sessions for 24 individuals, for a total of 72 interviews. The interview questions covered performances, difficulties and strategies, i.e. movements that users chose to imagine for KMI. The questions were designed to clarify users' choices, the reasoning behind them, and identify any barriers they encountered during the training. Interviews were analysed to identify any training parameters that users found difficult or distracting, which is a lever to better understand users' needs and to ultimately design better exercises for the future of BCI user training [11].

*Results:* Thematic analysis showed important inter-individual discrepancies. While some user struggled to find strategies, others found it easy. Similarly, KMI was difficult for some users, but many others explained that the KMI was not difficult per se. Still, users tend to report quick improvements in their KMI auto-evaluation within and between sessions.

Overall, this series of interviews highlighted various issues with common training protocols, some well-known, but that may not receive enough attention within the community. This includes:

- Users tend to be prone to overthinking, and they struggle to go or stay in a relaxed state.
- BCI requires focus, fighting fatigue, and coping with bad performances.
- Handling artefacts and avoiding movements is difficult and consumes attention.
- Eyes-open imagination is hard, especially with continuous feedback.
- Inter-trial duration can feel too short, and MI can be hard to maintain over the trial duration.
- Some MI tasks may implicitly involve other body parts and interfere with right/left separation.
- Users do not always contain their curiosity and sometimes can show unexpected behaviours such as disobeying instructions.
- Understanding feedback is hard, notably identifying min/max and assimilating sham feedback.
- Contextual factors can strongly affect the KMI experience, e.g. room temperature.

*Discussion/Significance:* Interviews were conducted with healthy users over their three first BCI sessions. Although results might not apply well to all populations, they suggest overall that BCI training is highly demanding and causes users to struggle despite high motivation. This emphasizes the need for the development of more engaging and effective training approaches that help novice BCI users explore the interaction, understand instructions and feedback, and maintain focus during training.

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