

Care professionals' perspectives on BCI needs in children and adolescents with severe cerebral palsy

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Introduction: For some children with cerebral palsy (CP) communication can be severely impaired. Brain-Computer Interfaces (BCIs) are a potential communication solution for these children. Yet, the actual need for this technology among these children, including their perception on the opportunities, is unclear. Therefore, the current project aims to map the needs, wishes and opportunities of BCIs for children/adolescents (8-25 years old) with severe CP (Gross Motor Functioning Classification System level IV and/or V; 'the target group') regarding communication. To that purpose, we assess the perspective of three populations: 1) the target group, 2) their parents/caregivers, and 3) involved care professionals. Here, we focus on the perspectives of care professionals.

Material & Methods & Results: To explore the perspectives of care professionals, online surveys were used, consisting of three sections: 1) demographic data, 2) current communication aids, and 3) BCIs. Thirty-six care professionals have completed the survey (34 female, 1 male, 1 unknown; age M=44.6 years, SD=11.01; years of experience with target group M=15.89 years, SD=10.16; 34 respondents still work with the target group, 2 in the past). Satisfaction with current communication methods (i.e., [a] no device (e.g. eye-gaze) or a letterboard/-book, [b] simple speech computers, and [c] high-tech communication equipment) was rated on a 5-point Likert scale (1=very unsatisfied, 5=very satisfied; [a] n=34; [b] n=25; [c] n=33). For respondents familiar with all three methods (n=24; [a] M=3.00, SD=0.78; [b] M=3.13, SD=0.85; [c] M=3.58, SD=0.65), a repeated measures ANOVA revealed a significant difference in the mean satisfaction scores between these three methods ($F_{(2,46)} = 4.850$, $p = .012$). To specify, the mean score for method C was significantly higher than for method B ($F_{(1,23)} = 6.457$, $p = .018$). No significant difference was found between the latter compared to method A ($F_{(1,23)} = .418$, $p = .524$). The majority (77.8%) of the care professionals was interested in BCI for the target group (e.g., allowing faster communication, increase autonomy and decrease frustration). When asked about which BCI control strategy is most suitable, 38.9% of the respondents scored P300 higher (=more suitable) than motor imagery on a 5-Point Likert scale, 38.9% rated them equally, and 22.2% vice versa. In addition, 41.7% of the respondents scored implanted recording electrodes higher than external electrodes on a 5-Point Likert scale, 36.1% rated them equally, and 22.2% vice versa. Non-parametric paired t-tests (Wilcoxon Signed Rank Test) revealed no significant differences in mean scores for either the BCI control strategy ($p = .318$; P300 M=3.47, SD=1.00; motor imagery M=3.22, SD=1.05) or the type of recording electrodes ($p = .150$; external M=2.97, SD=1.00; implanted M=3.36, SD=1.10).

Discussion & Significance: Knowledge on the perspectives of the different types of end-users and stakeholders is crucial to assess the need for alternative communication strategies for young people with CP, and to develop clinically viable BCI technology. The first results of this study indicate that most care professionals involved with the target group are interested in BCIs as a communication solution. Their preferences for the different BCI approaches are variable. In order to better understand the perspective of this group, we will perform a qualitative analysis of the open questions included in the questionnaire.

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