Creating and Testing a Brian-Controlled Musical Instrument for Therapy in Children with Cerebral Palsy

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Background

Children with cerebral palsy (CP) often experience variations in attention span, hindering other cognitive development areas [1].

Neurologic Music Therapy (NMT)

Effective in enhancing attention and concentration in children with neurological disorders [2].

Brain-Computer Interface (BCI)

Electroencephalogram (EEG)-BCI can improve accessibility to NMT for children with CP [3].

Objective

To design and evaluate an EEG-BCI-enabled music instrument for neurologic music therapy to improve attention in children with CP.

Methods

System Configuration Involved

1 The BCI R-Net Headset

Served as the interface for capturing brain activity signals.

2 The Mindset Application
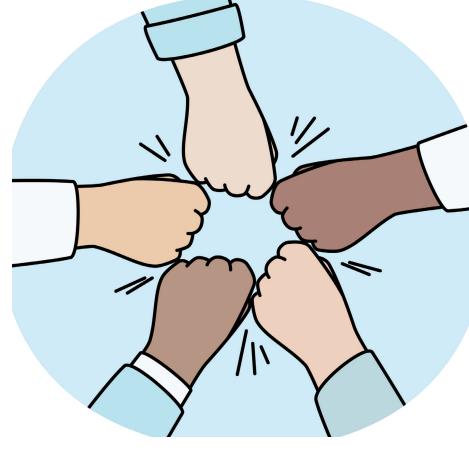
Facilitated the connection between BCI and the sound beam through a relay box.

3 The Sound Beam
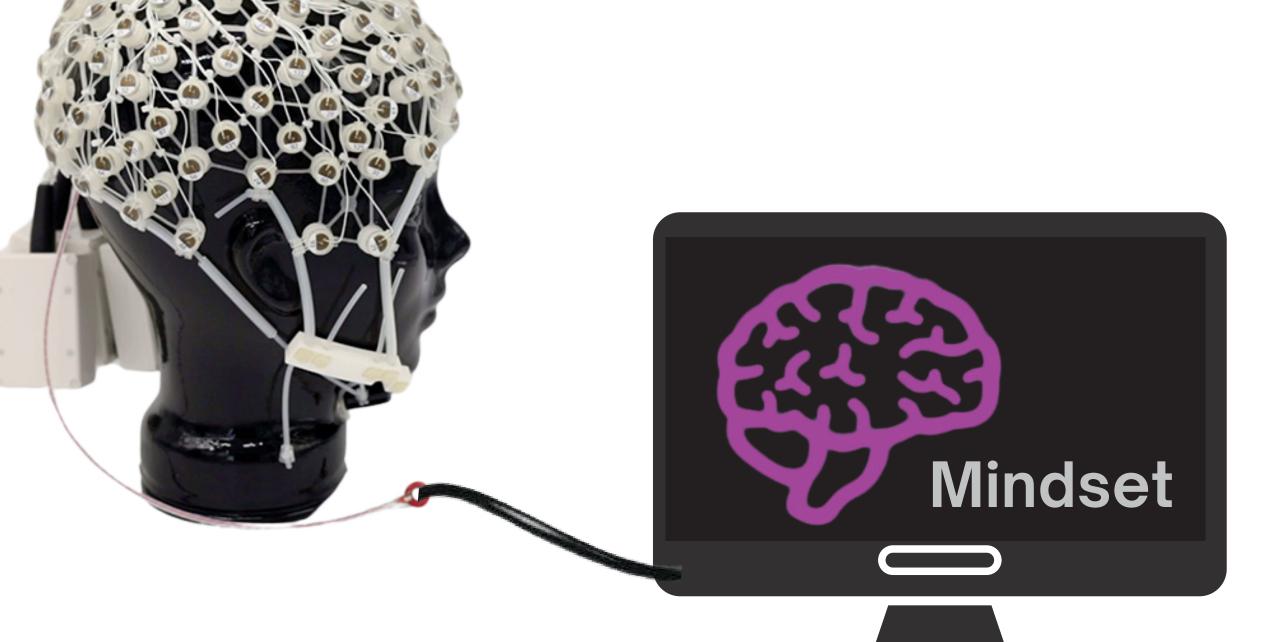
Generated the desired musical output based on the user's mental commands.

Protocol and Goals Development

Collaborated with an interdisciplinary team of other **researchers, clinicians, and music therapists** to inform protocol development and therapeutic goals.

Integrating BCI technology into music therapy is an innovative and enjoyable way to <u>enhance therapeutic outcomes</u> for children with CP

Mindset

Holland Bloorview
Kids Rehabilitation Hospital

Bloorview
RESEARCH INSTITUTE

Results

System testing demonstrated that BCI integration facilitated user control of the sound beam, producing a musical output through mental commands.
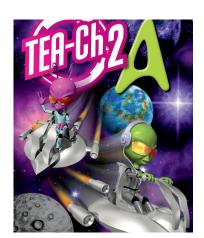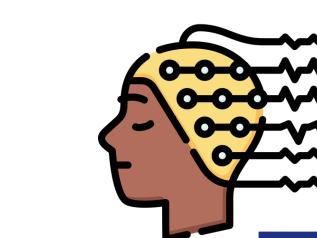

Next Steps

5 children with CP will be recruited to participate in **8 weeks** of BCI-NMT sessions. Outcomes will be measured using changes in Test of Everyday Attention for Children 2 (Tea-Ch2) results, EEG recordings, and neuroimaging.

TEA-Ch2 Attention Tests

EEG Recordings

Neuroimaging

SCAN FOR STUDY INFORMATION

Relavance

- [ ] Reinforces Holland Bloorview's commitment to holistic, family-centered care.
- [ ] Ensures effective, enjoyable treatment.
- [ ] Aims to enhance the quality of life for children with CP and their families.

References

[1] Yang, S. et al. (2022). https://doi.org/10.3389/fneur.2022.852277
[2] Santonja-Medina, C. S. et al. (2022). https://doi.org/10.3389/fneur.2022.795533
[3] Karlsson, P. et al. (2022). https://doi.org/10.1007/978-981-16-5324-7_2