Brain-computer interfaces provide a new access method for children with disabilities to communicate.

Introduction
- Communication is challenging for children without expressive speech and functional movements.
- Brain-computer interfaces (BCIs) provide an access method that allows users to control applications with only their brain activity.
- We developed Mindset, a BCI access solution that allows users to control augmentative and alternative communication (AAC) applications.

Methods
- 20 children (between 8 and 19 years old) with special communication needs will be recruited for 2 study sessions.
- Participants will wear the Emotiv EPOC X, a consumer-grade electroencephalography (EEG) headset and train a visual P300-based BCI system.
- Participants will select predetermined buttons on personalized symbol-based AAC interfaces (created in Tobii Dynavox Communicator 5) using the BCI system.
- Online BCI performance for each subject will be measured by the classification accuracy and information transfer rate.
- Surveys will be administered to assess usability and cognitive workload of the BCI system.

Brain-computer interfaces provide a new access method for children with disabilities to communicate.

Research Question
Can children with disabilities use a BCI system to communicate simple messages with AAC interfaces?

Results
We expect the performance of the proposed BCI communication system for a 6-button and 12-button symbol-based grid to be comparable to that of P300 spellers that use research-grade EEG headsets reported in the literature.

Significance
Mindset provides children with a new access method for communication that bypasses the need for speech and physical movements. This research demonstrates the feasibility of a BCI communication system built upon affordable consumer-grade hardware and software.