Brain-Computer Interface (BCI): Research in Communication, Control and Human Cognition (Chang S. Nam; csnam@ncsu.edu)

What is a brain-computer interface?
A non-muscular communication and control system that does not depend on the brain’s normal output pathways of peripheral nerves and muscles.

Thinking for Typing by Paralyzed Persons

Research Goal
To assess how background noise and screen size affect task performance, neural activity and cortical integration of users with and without severe motor disabilities.
Can they use BCIs in a mall food court, city park, or street café?

Independent Variables
- Task Performance
- Task Performance Morphology
- Noise Intensity

Severe motor disability affected functional cortical integration

Significant difference in coherence between the two groups.
Participants with severe neuromuscular impairments, as compared with the able-bodied group, were assigned to receive more cortical regions, reflecting a less efficient connectivity strategy for the task.

Breakling Silence of Vegetative State Patients

Motivation for Research
- Patients in minimally conscious state are often misdiagnosed as being in vegetative state.
- BCIs can help precisely diagnose patients and allow for communication with outside world;
- BCIs do not require using pathways of peripheral nerves and muscle movement.

Approach & Preliminary Results

Neural Correlates of Executive Function in Brain

Research Goal
To investigate the hypothesis that the level of memory load could determine the impact of task interference.

To analyze information flow between anatomically localized sources of brain activity during correct responses, and in particular erro-compensation.

Selected Publications

Funding Agencies
- NSF BRAIN Initiative (IIS-1421948)
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