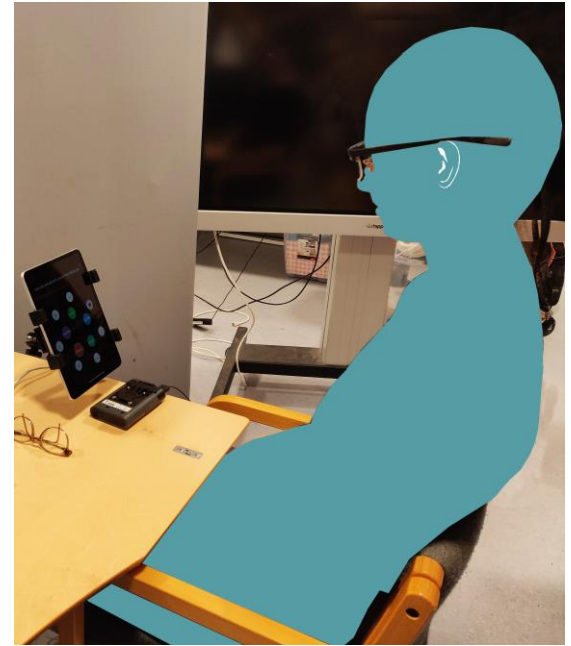


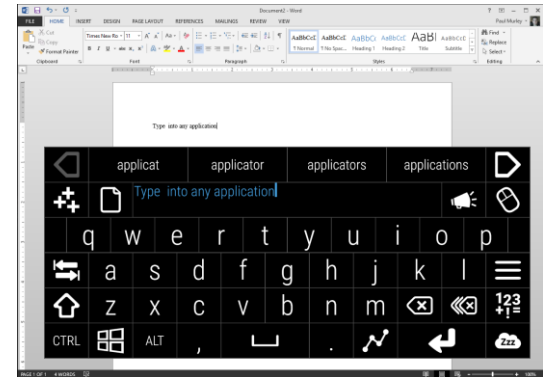
Mental Fatigue Detection using an iPad



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People with neurological disorders

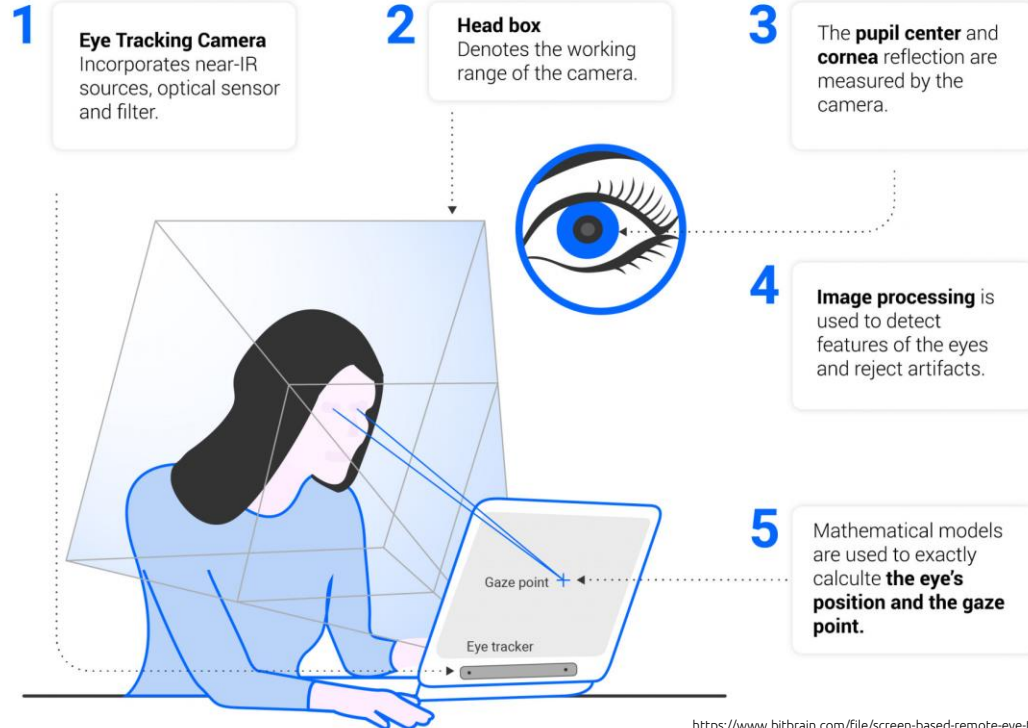
- People with cerebral palsy (CP), amyotrophic lateral sclerosis (ALS) do not have control over muscles
- Alternative and Augmented Communication (AAC) systems are an integral part of life for people with neurological disorders
- Eye-tracking commonly used with the communication system
- Fatigue can affect the communication using devices



Mental Fatigue

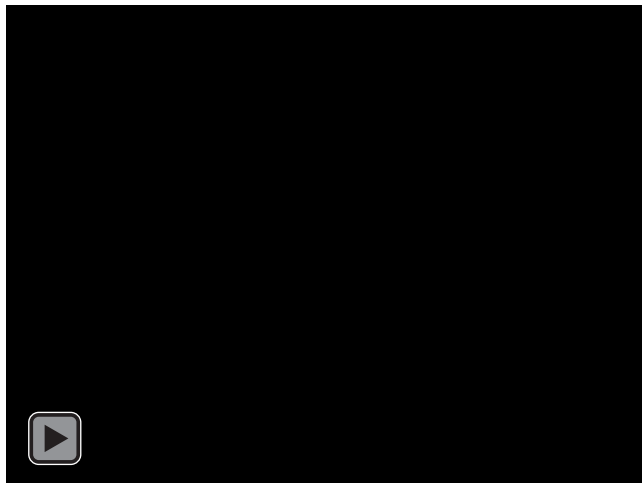
Mental fatigue is a subjective feeling associated with a **reduction in mental resources**, including attention and information processing abilities, and a reduced motivation that develops with **sustained cognitive effort** over **time** and that can affect performance.

Eye-tracking



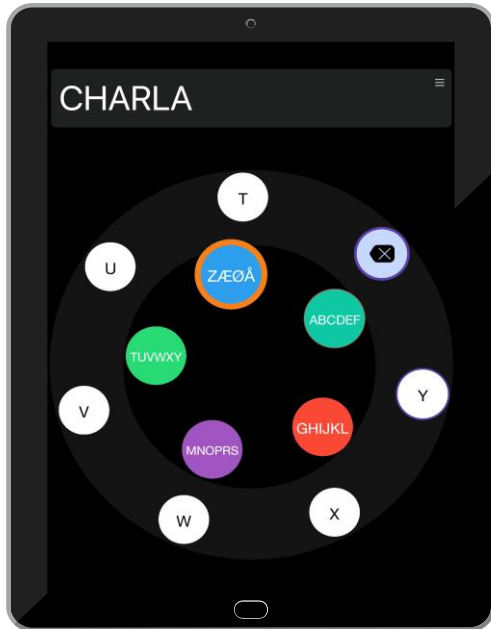
Smooth-pursuit eye movements

Visual tracking



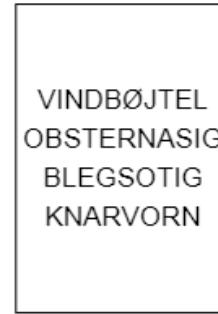
Study Design

- Goal: Smooth pursuit eye movements to detect mental fatigue



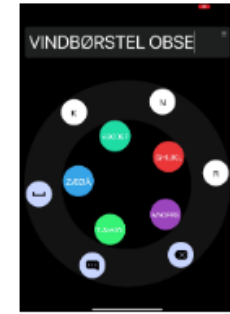
Task:

read and memorize



20 s

eye-typing



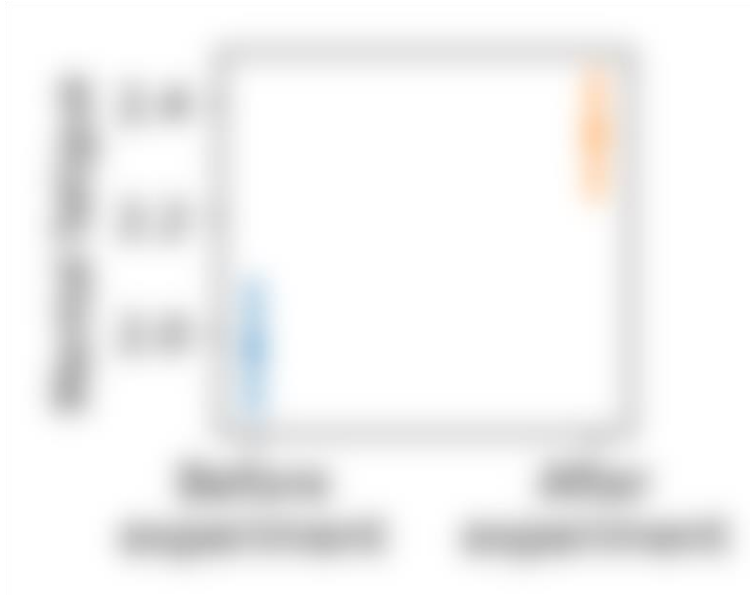
self-paced

- 30 Participants
- 15 Males, 15 Females
- Age: 18 - 47 years
- No photosensitive epileptic seizures or a history of a brain disorder

Subjective Questionnaires

Mental Fatigue:

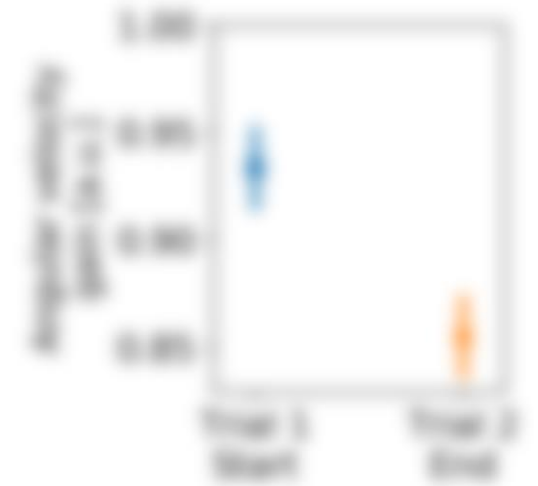
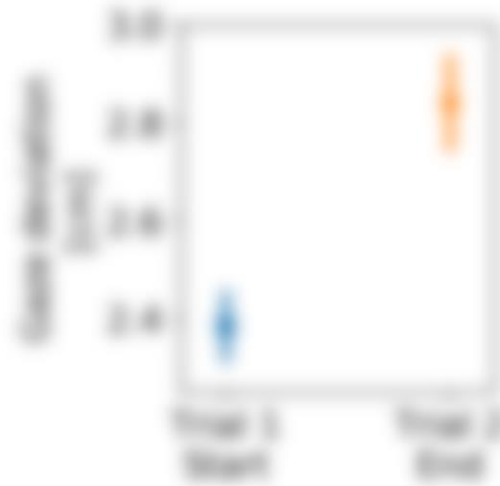
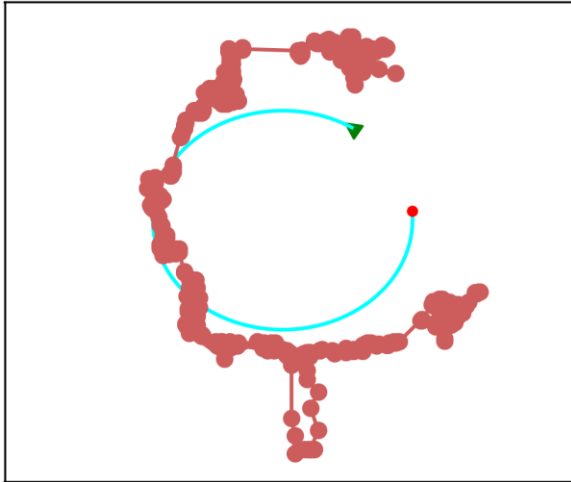
How difficult is it to concentrate and think clearly?



Eye movement results

Gaze deviation: Root mean squared error between eye and target position

Velocity gain: Ratio of eye velocity to target velocity



Conclusion

Mental Fatigue was affected by time spent on eye-typing,
and detected using eye movement characteristics

Thank you