Shedding a Little Light on Brain-Related Research
Simon Werven

Why Study the Brain?
- Control center for thoughts, feelings, and actions
- Determine biological/psychological causes of brain disorders and potential treatments
- Understand the framework of cognitive decline in older adults

Dr. Nielson's Aging, Imaging, and Memory (AIM) Laboratory
- Undergraduate Research Assistant
- Conducted statistical analyses of existing data from previous experiments
    - Data was from the Go/No-Go task and the Famous Names Task
    - *Go/No-Go Task for response inhibition: (Scroll down and click "run the demo" to try a similar task)* https://www.psytoolkit.org/experiment-library/go-no-go.html
    - *Famous Names Task for semantic memory recall: Task consisted of presenting real and fake famous names to participants. Subjects had to determine if name was famous or not*
    - Look for significance in oscillatory activity (Theta, Alpha, Beta waves)
    - Analyze influence of age and underlying factors on executive functioning and memory

Recording Brain Activity
- Various instruments and techniques used to record neural activity within the brain
    - https://psychcentral.com/lib/types-of-brain-imaging-techniques/
- Primarily focused on electroencephalogram (EEG) technique in AIM Lab
    - Event-Related Potentials (ERPs) are markers of electrical activity in response to a stimulus
    - An EEG records ERPs and their oscillatory activity through electrodes placed on the subject's scalp
    - *Videos on ERPs and EEG information: (Must create free account to access content)* https://courses.erpinfo.org/

Research from the Perspective of an Undergraduate
- The brain is complex, and the research behind understanding it is necessarily complex as well
- Learning terminology and methodology takes time. Learn as you work
- People normally see the final product of research in presentation form. The maturation of research from the hypothesis to the conclusion takes time and effort

Personal Future Direction
- Analyze the influence of emotion and age on semantic memory networks in Dr. Nielson's laboratory
    - Semantic memory is a type of long-term memory that relates to the recall of concepts or facts
- This research could lend itself to better understanding the mechanisms involved in cognitive decline

Works Consulted

Correro, Anthony N., et al. "The Role of Alexithymia in Memory and Executive Functioning across the Lifespan." *Cognition and Emotion*, 2019, pp. 1–16., doi:10.1080/02699931.2019.1659232.

Demitri, Michael. "Types of Brain Imaging Techniques." *Psych Central*, 30 July 2020, psychcentral.com/lib/types-of-brain-imaging-techniques/.

Farrer, Lindsay A., et al. "Effects of Age, Sex, and Ethnicity on the Association Between Apolipoprotein E Genotype and Alzheimer Disease. A Meta-Analysis." *Jama*, jamanetwork.com/journals/jama/fullarticle/418446.

Luck, Steve, and Emily Kappenman. "Virtual ERP Boot Camp: Introduction to ERPs." *Virtual ERP Boot Camp*, NIH, 2020, courses.erpinfo.org/.

Nielson, Kristy A., et al. "Age-Related Functional Recruitment for Famous Name Recognition: An Event-Related FMRI Study." *Neurobiology of Aging*, vol. 27, no. 10, 2006, pp. 1494–1504., doi:10.1016/j.neurobiolaging.2005.08.022.

PsyToolkit, 7 Sept. 2020, www.psytoolkit.org/.

Wagner, Johanna, et al. "Establishing a Right Frontal Beta Signature for Stopping Action in Scalp EEG: Implications for Testing Inhibitory Control in Other Task Contexts." *Journal of Cognitive Neuroscience*, vol. 30, no. 1, 2018, pp. 107–118., doi:10.1162/jocn_a_01183.