# Relationship Identification Between Triggers and Electrophysiological Changes in the Brain and the Overall Human Electrophysiology During Migraines

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## Abstract

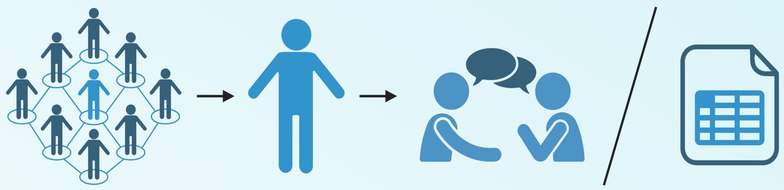
This research aims to reinforce that migraines have environmental triggers, establish that migraines cause changes in the brain's electronics and the body's overall electrophysiology, and define the relationship between the changes and the triggers. Throughout the study, the participants will fill out several surveys about their daily habits, any migraine episodes, and any possible triggers. Additionally, the participants will undergo several tests with an Electroencephalogram (EEG), Electrocardiogram (ECG), Galvanic Skin Response GSR, and pulsometer to accurately record their electrophysiology, then they may undergo the same test during a migraine so that differences in their electrophysiology can be noted. These changes will then be correlated to their triggers, and the research team will determine if there are patterns between the corresponding changes and triggers across several different participants.

## Introduction

- Migraines are neurological conditions that affect nearly a fourth of the entire world population, 18% female and 6% male (Harriott 2019).
- The goals of this project are: to reinforce that migraines have environmental triggers, establish that migraines cause changes in the brain's electronics and the body's overall electrophysiology, and define the relationship between the changes and the triggers.
- The hypothesis is that there is a relationship between environmental triggers and specific electrophysiological changes in the brain and the overall human electrophysiology.
- The population will be the young adults of Embry-Riddle Aeronautical University, and the sample size will be determined using the aforementioned gender split between female and male as well as the Sample Size for Known Population equation.
- Several general health, neurological, and psychological factors will be taken into consideration when making the selection of the samples.
    - Level of fitness, daily habits, sex assigned at birth, current identity of sex, age, past treatments, other diagnosis, and more.
- Throughout the study, the participants will fill out several surveys about their daily habits, any migraine episodes, and any possible triggers.
- Additionally, the participants will undergo several tests with an Electroencephalogram (EEG), Electrocardiogram (ECG), Galvanic Skin Response GSR, and pulsometer to accurately record their electrophysiology, then they may undergo the same test during a migraine so that differences in their electrophysiology can be noted.

## Methodology

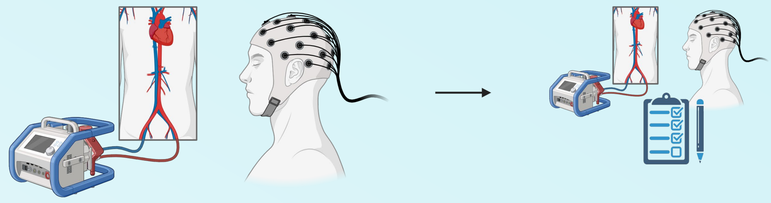
### Part 1



Select participants from ERAU population

Gather general medical and neurological information from the participants into a database

### Part 2

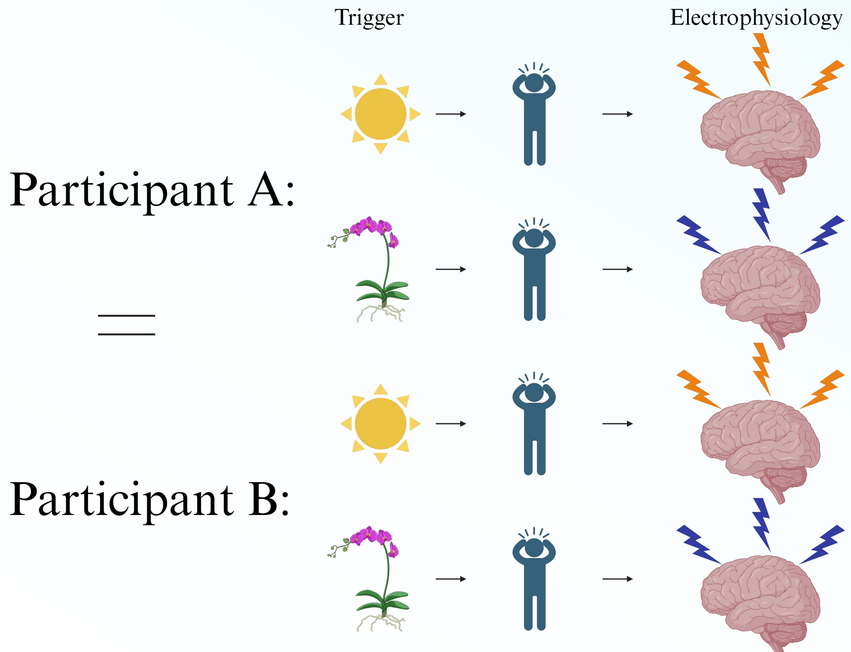


A set of tests will be done, including an EEG, ECG, GSR, and Pulsometer, to obtain a baseline

~3x

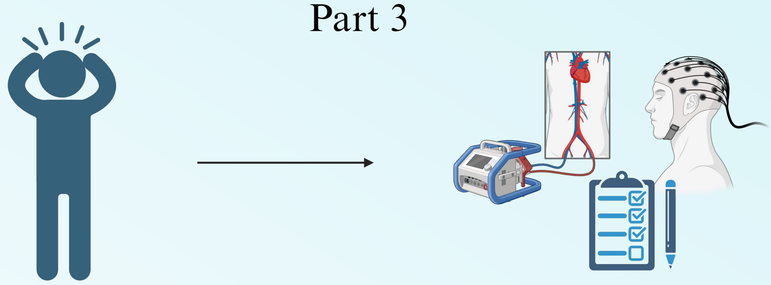
These tests will be repeated ~3 times on each participant over 4 months. The participant will also fill out semi-weekly forms about their day to day

## Theory and Data Analysis




- The electrical changes in the brain are distinctive of the triggers that caused the episode
- These changes are similar between different individuals as long as the trigger was similar.
- These electrophysiological changes are specific to the brain but they share similarities to the changes throughout the body

### Part 3



Whenever the participant suffers from a severe headache or migraine they will be invited to take the test for more accurate results. They will also be asked to fill out an additional form detailing their episode