Final Project

The data and collection methods
The data is collected during a series of complex neurolingustic experiments on healthy (self-reported) subjects. In this particular project I'm focused only on a small part of the experiments. This part deals with the application TMS pulses to the specific areas of the brain, associated with pronounciation (but not limited to) of particular phonemes. The idea is that it supposedly affects the subject's ability to discern phonemes when listening. The pulse may make it easier for subject to correctly recognize a phoneme by listening to a sound sample when the pulse is applied to the corresponding area. It may also hinder this ability when the pulse is applied to an area related to pronounciation of a different phoneme. Potentially, there are two target variables in the dataset: reaction time and the correctness of the answer. The predictor variables are phoneme, order (CV or VC), emotion of the sound sample (angry, happy etc.), kind of phoneme (bilabial, dental), and most importantly, whether the pulse was actually applied. There also some additional variables, but I'm yet to decide whether to use them.

The experiment, briefly
A subject is exposed to a number of sound samples. Before each sample is played, a sequnce of two TMS impulses is applied to the target area. Then the subject is supposed to press a key corresponding to the phoneme that was heard. The subject also pronounces the same phoneme (not used in this study). In some cases there are no pulses.

Preliminary list of methods
I expect to tackle both regression and classification problems because there are two target variables available. *Classification hypothesis*: application of TMS pulse makes a correct answer more likely. *Regression hypothesis*: application of TMS pulse reduces reaction time.

- T-test
- ANOVA
- Linear and Logistic Regression
- Mixed-effect models (possibly)
- Random Forest (variable importance)

Exploring other variables

- Phonemes with vowels at the begining are easier to discern than phonemes with consonants in the same position (order has an impact on reaction time and correctness)
- Emotion of the sound sample affects its discernability
- Kind of phoneme has an effect on its discernability
- Some phonemes may be just more difficult to discern