

# The probabilistic mind: A Bayesian cognitive modeling tutorial

## Introduction

### Technical objective

Learn the basics of Bayesian cognitive modeling, a method for simulating the mind's psychological processes as functions of a Bayesian inference machine

### Substantive research question

How do feelings of stress and dominance emerge in response to conversations with partners of the same and different gender?

### Bayesian cognitive modeling

TODO: talk about the concept of cognition (and reappraisal/emotion) as a generative Bayesian processes over abstract knowledge (or something like that...)

### Emotional reactivity to social interactions

In this tutorial... [TODO: prior literature]

### The present study: Gender, stress, and dominance in social interactions

TODO: outline the specifics of the analysis you are about to perform

## Preliminaries

### Load libraries and data

We read in the data from the online repository.

```
# set filepath for data file
filepath <-
  "https://raw.githubusercontent.com/The-Change-Lab/collaborations/main/AMIB/AMIB_persons.csv"
# read in the .csv file using the url() function
AMIB_persons <- read.csv(file=url(filepath),header=TRUE)
```

```
# set filepath for data file
filepath <-
  "https://raw.githubusercontent.com/The-Change-Lab/collaborations/main/AMIB/AMIB_interaction.csv"
# read in the .csv file using the url() function
AMIB_interaction <- read.csv(file=url(filepath),header=TRUE)
```

## 2.2 Data manipulation

Contributions of personal stress level and partner's gender to dominance in a social interaction:

TODO: change the partnerGender variable to be [0 = same gender interlocutor vs. 1 = opposite/different gender interlocutor] TODO: try to write this model in greta (a PPL hosted in R that runs atop TensorFlow inference algos: [https://cran.r-project.org/web/packages/greta/vignettes/get\\_started.html](https://cran.r-project.org/web/packages/greta/vignettes/get_started.html))

```
var getIgdom = function(partnerGender, stress) { // igdom = interaction-level dominance
  if (partnerGender == 1) { // partner is female
    return stress == 1 ? 7 : 5
  } // partner is male
  return stress == 1 ? 6 : 4
}

var model = function () {
  var partnerGender = flip() // equal chance of having male vs. female partner
  var stress = flip(0.3) // 30% chance of being stressed
  var igdom = getIgdom(partnerGender, stress)
  condition(igdom >= 5)
  return partnerGender
}

var dist = Infer({method: 'rejection', samples: 1000}, model)
viz(dist)
```

TODO: plot the model

TODO: evaluate the model against the data