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 probabilistically in response to conversations with partners of the same and different gender?

Emotional reactivity to social interactions

In this tutorial... [TODO]

```
# set filepath for data file
filepath <- "https://raw.githubusercontent.com/LRI-2/Data/main/ILD/AMIBshare_persons_2019_0501.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/LRI-2/Data/main/ILD/AMIBshare_daily_2019_0501.csv"
# read in the .csv file using the url() function
AMIB_daily <- read.csv(file=url(filepath),header=TRUE)
```

```
# set filepath for data file
filepath <- "https://raw.githubusercontent.com/LRI-2/Data/main/ILD/AMIBshare_interaction_2019_0501.csv"
# read in the .csv file using the url() function
AMIB_interaction <- read.csv(file=url(filepath),header=TRUE)
```

Note: This code doesn't run because WebPPL has not been set up (yet).

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 overtop TensorFlow inference algos: 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: dig into the data and try to make a model that matches the data