

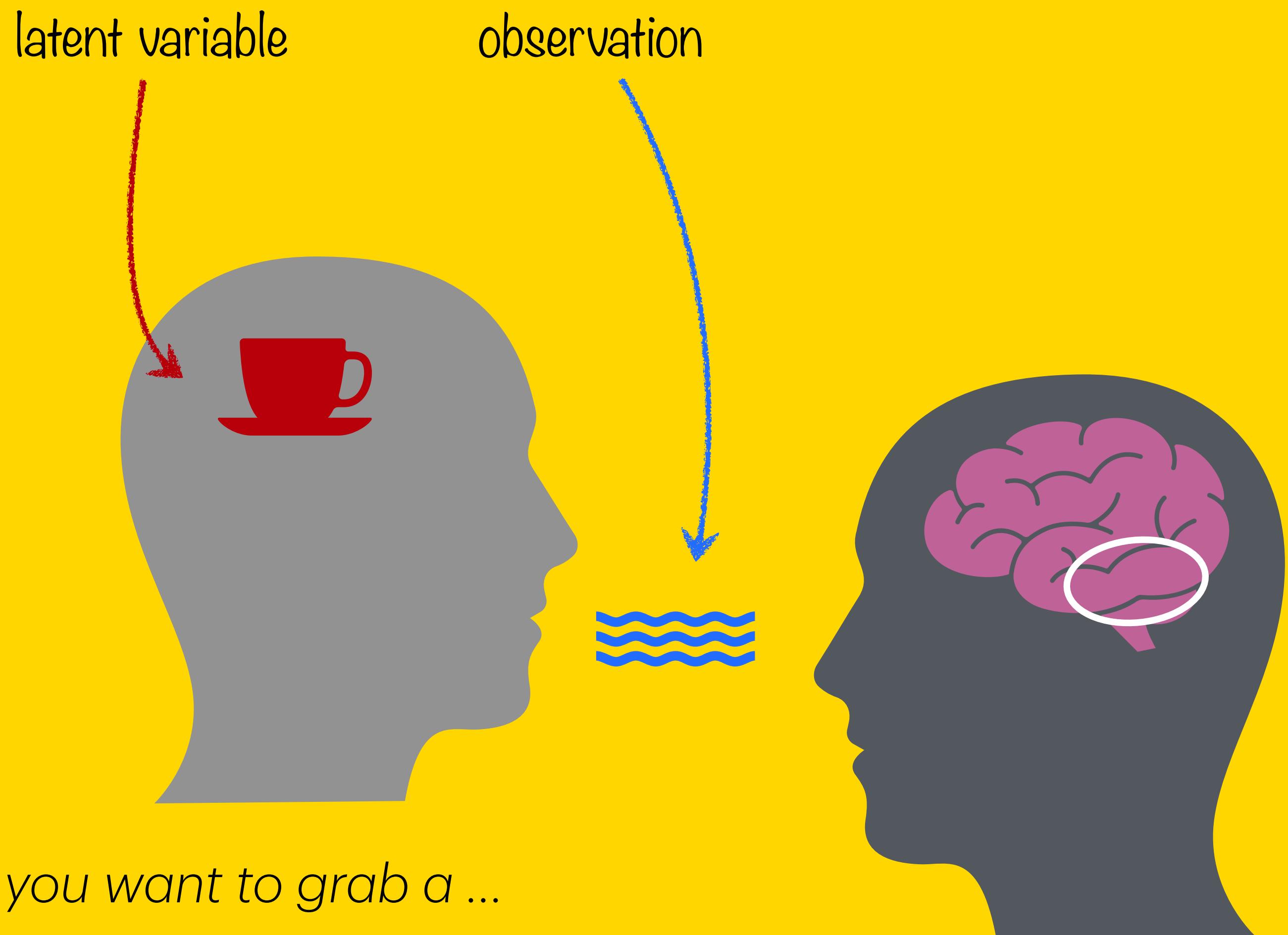
# BAYES + BACH + AN RNN POWERED AFFAIR

BRAINHACK DONOSTIA 2024

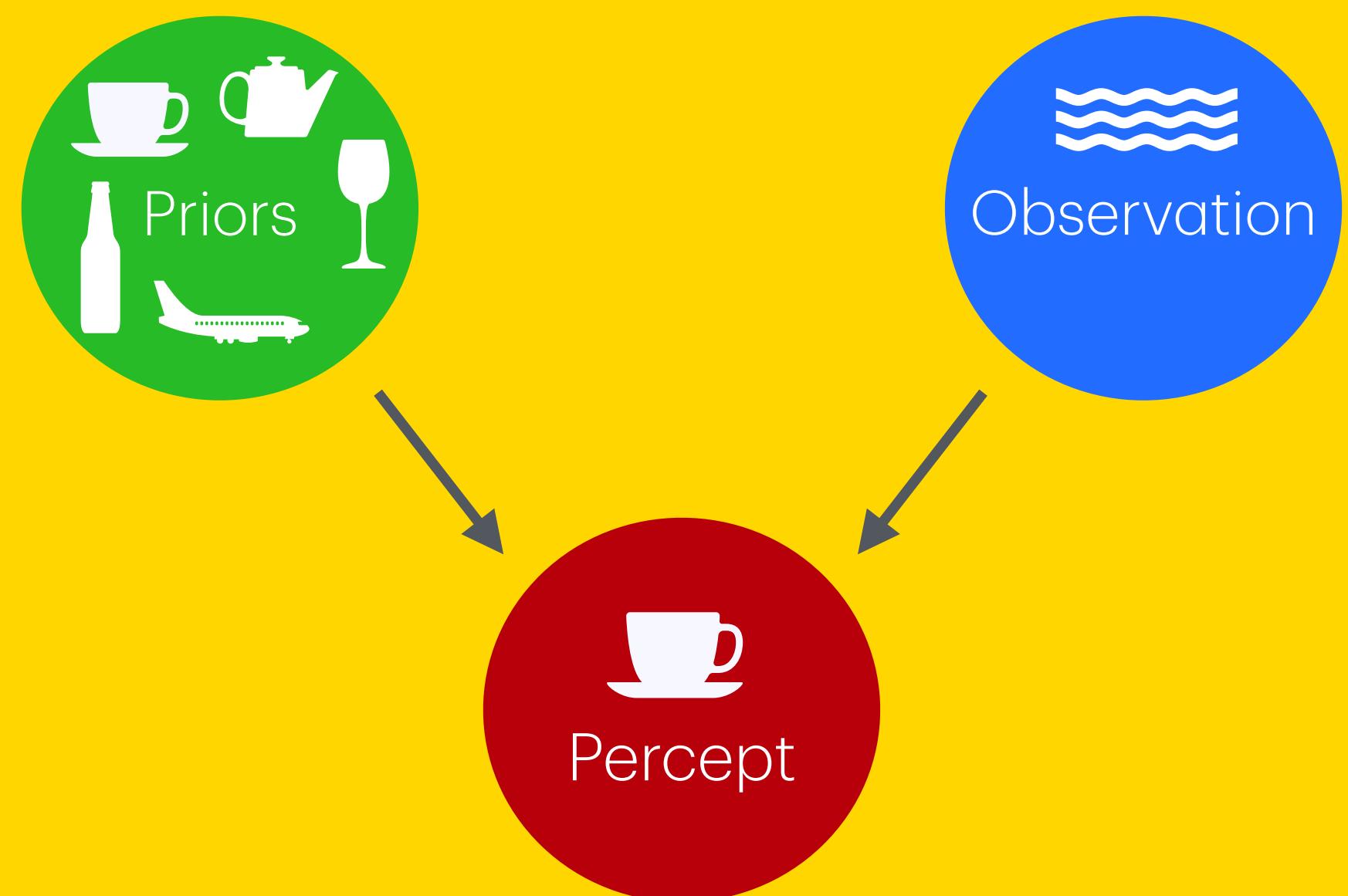
[github.com/qtabs/  
BayesPlusBach](https://github.com/qtabs/BayesPlusBach)



# Perception is actually statistical inference



*Do you want to grab a ...*



Or more eloquently,

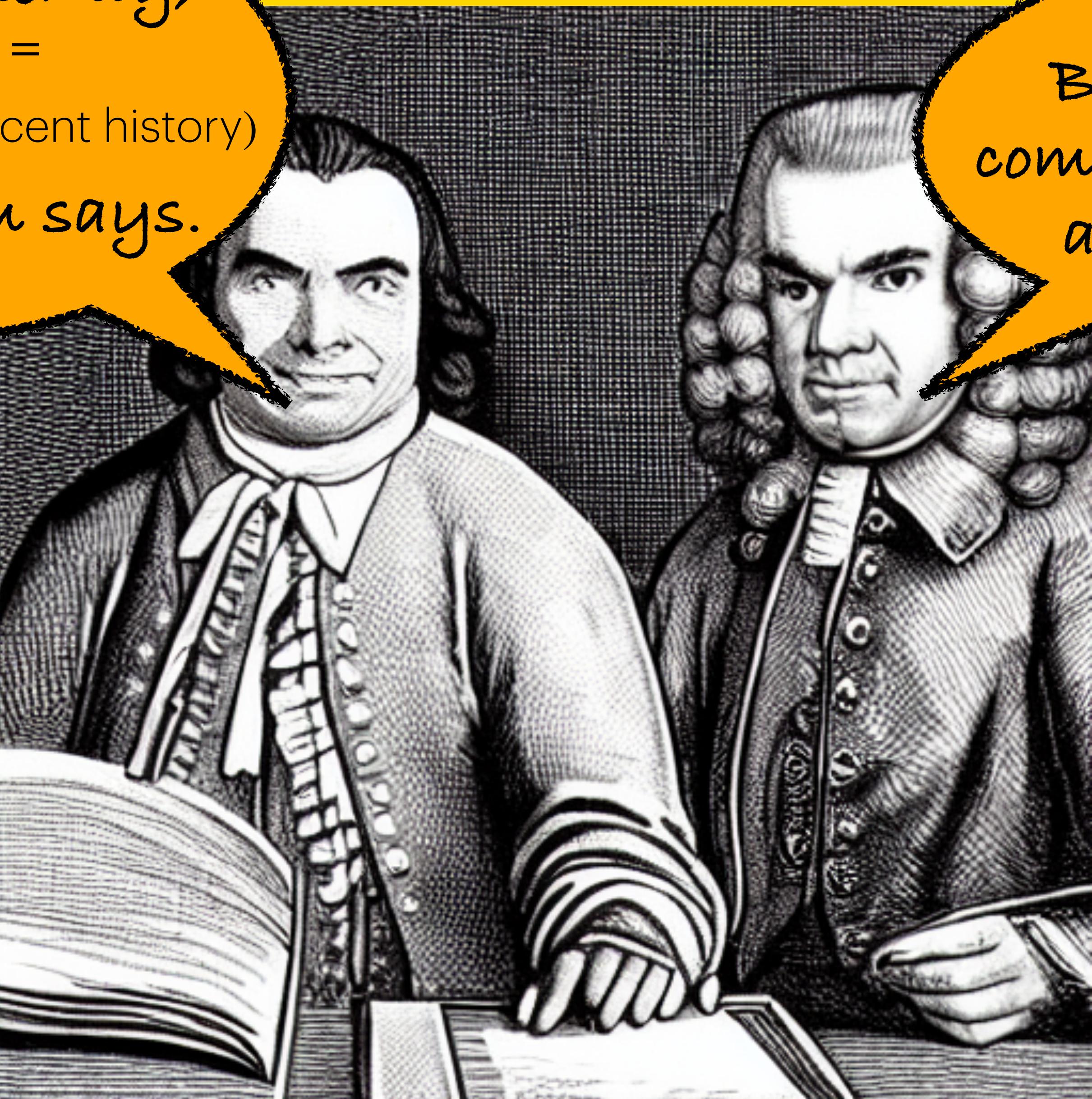
$$p(\text{☕} | \text{~~~~}) =$$

$$p(\text{~~~~} | \text{☕}) p(\text{☕} | \text{recent history})$$

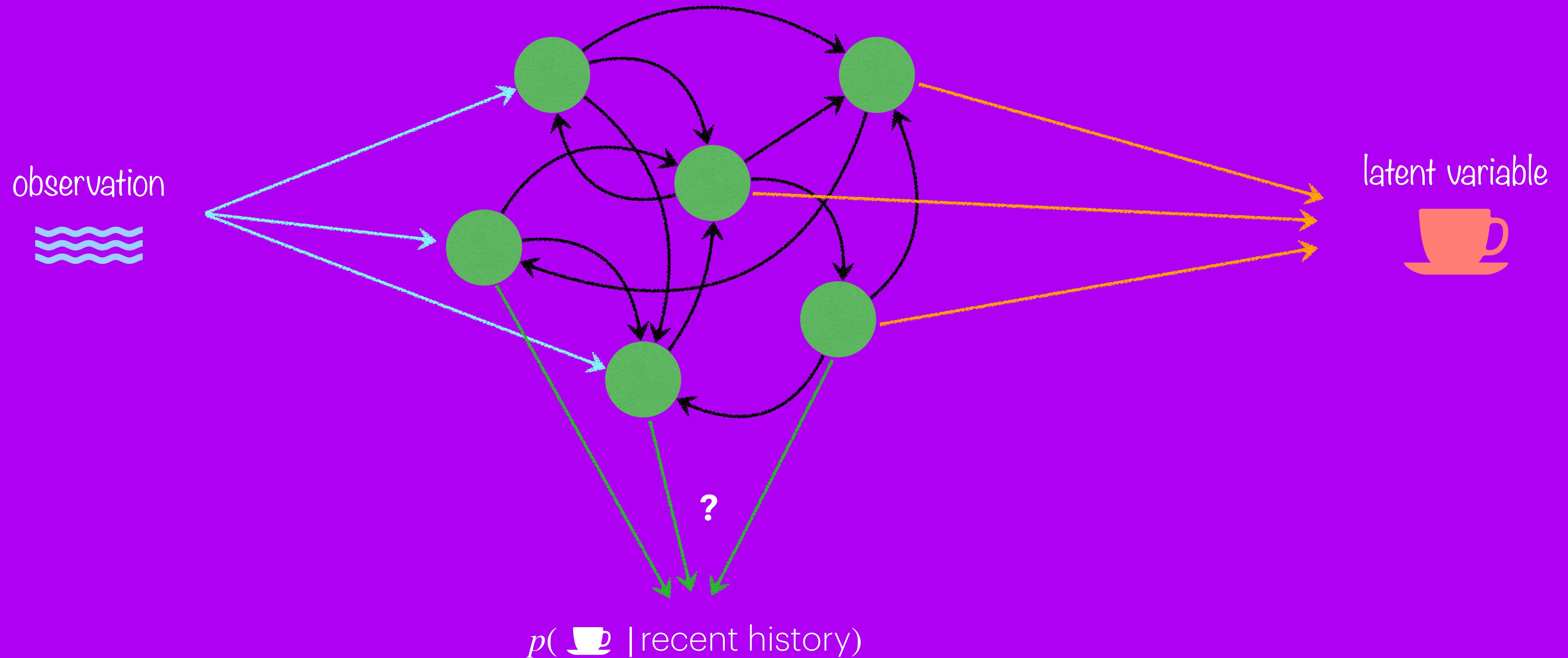
as MY theorem says.

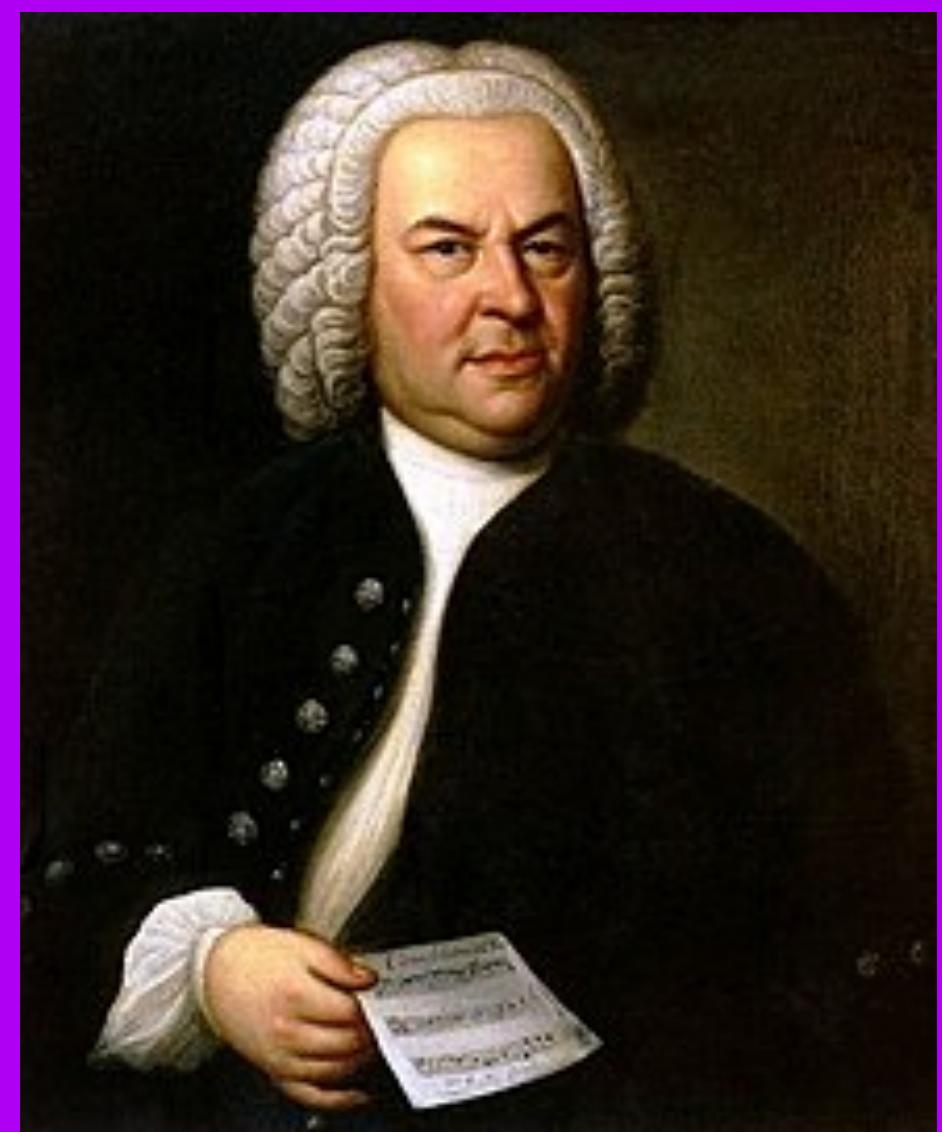
shut up

Bayes. You didn't  
come up with that stuff  
and you know it.

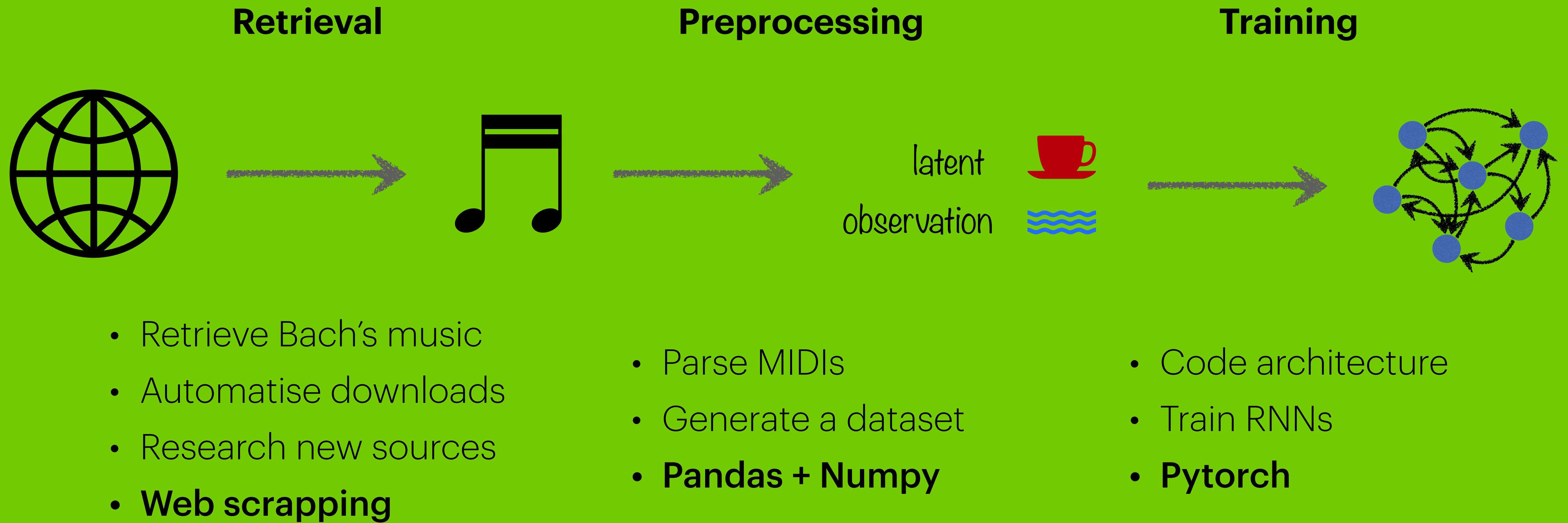


# Training RNNs as a metaphor for learning





# Three teams to make Bayes love Bach again



# In conclusion:

Hands-on comp-neuro modelling

Sexy Machine Learning stuff

Finally getting Bayes' theorem

Bach in the background nonstop

WHAT ELSE?!

**DETAILED INFO:**  
[github.com/qtabs/BayesPlusBach](https://github.com/qtabs/BayesPlusBach)



# Work teams, this time for real

## Retrieval

- Find trustable sites with Bach's MIDIs
- Automatise MIDI downloading
- Determine works used for training
- Quality control of the MIDI dataset

**Skills:** (Beginner coding) OR music

**Learn:** Web scrapping, Bach, music

## Preprocessing

- Decide on the format of the samples
- Decide latent- > observations map
- Convert MIDIs to sequences of tones
- Generate training/testing datasets

**Skills:** basic python OR stats OR music

**Learn:** Numpy, Pandas, stats

## Training

- Code RNN in python
- Decide RNN architectures to test
- Devise objective function
- Tune training hyperparameters

**Skills:** python OR machine learning

**Learn:** PyTorch, machine learning

## Benchmarking

- Devise alternative heuristic models
- Try to assess optimality tools
- Code the visualisation of results

**Skills:** python OR stats OR maths

**Learn:** stats, numpy, visualisation

## Testing

- Code linear networks to readout RNN
- Devise testing strategies
- Define quantities used for testing

**Skills:** python OR stats OR ML

**Learn:** PyTorch, ML, stats

# Minimally-working deadlines

