Intro Talk

Simulation of EEG-Activity Based on Sequential Sampling Models

M.Sc. Business Informatics
Timo Zaoral

Table of Content

About Me

- Timo Zaoral
- Born in 2000; Living in Mundelsheim

TRUMPF

DHBW Stuttgart

2019-2022

SOSE 2024

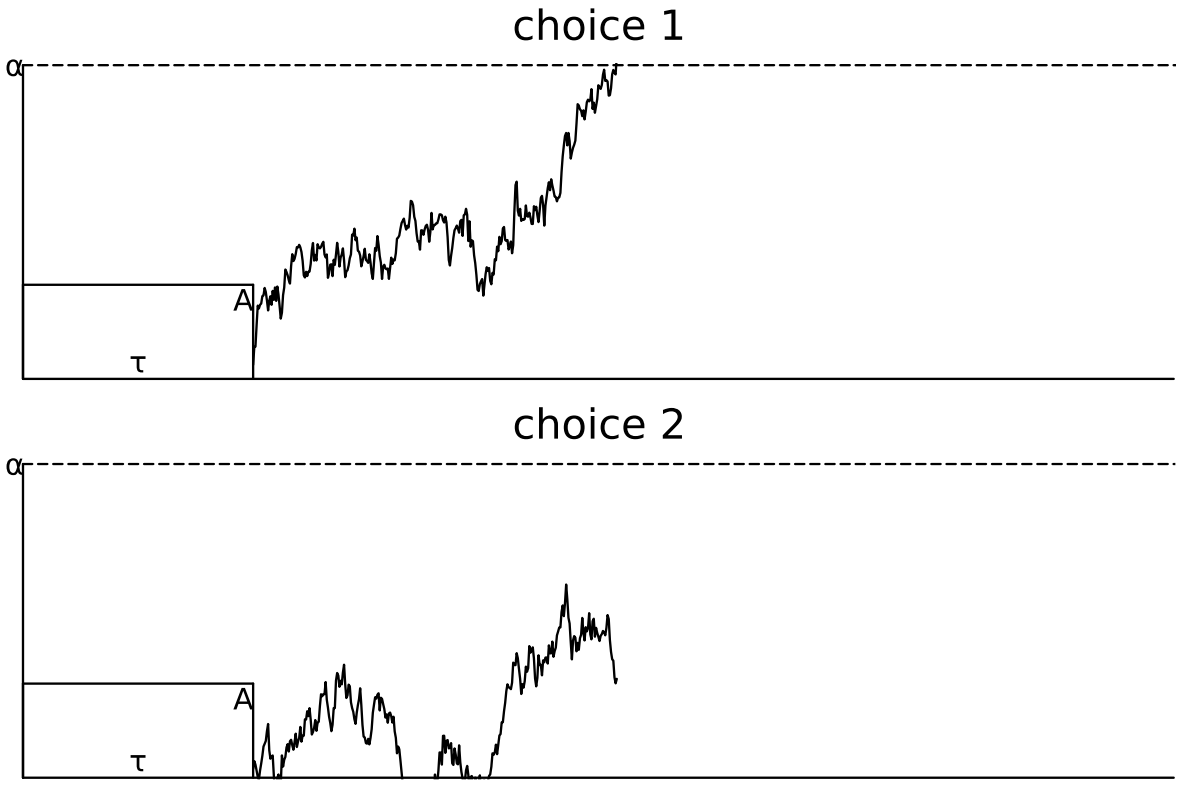
Universität Stuttgart

2022-Now

Working for TRUMPF

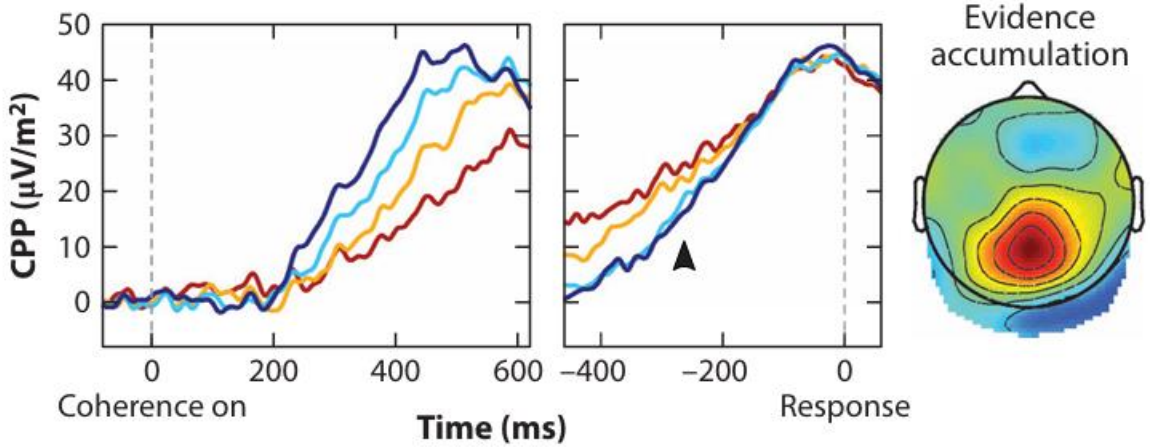
Kelly et. al Model of neural activity in Julia

Sequential sampling models (SSM) depict the decision-making process in the brain



own illustration

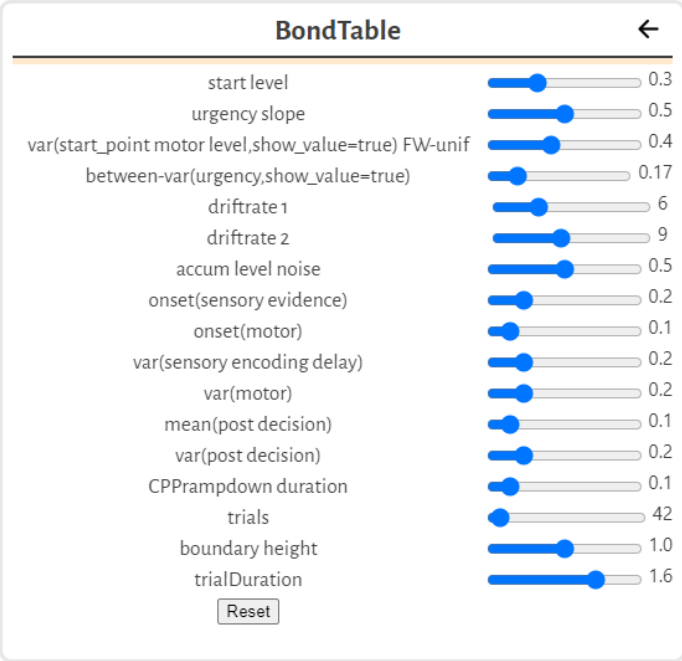
Evidence-dependent structural dynamics of the component centroparietal positivity (CPP) in the brain



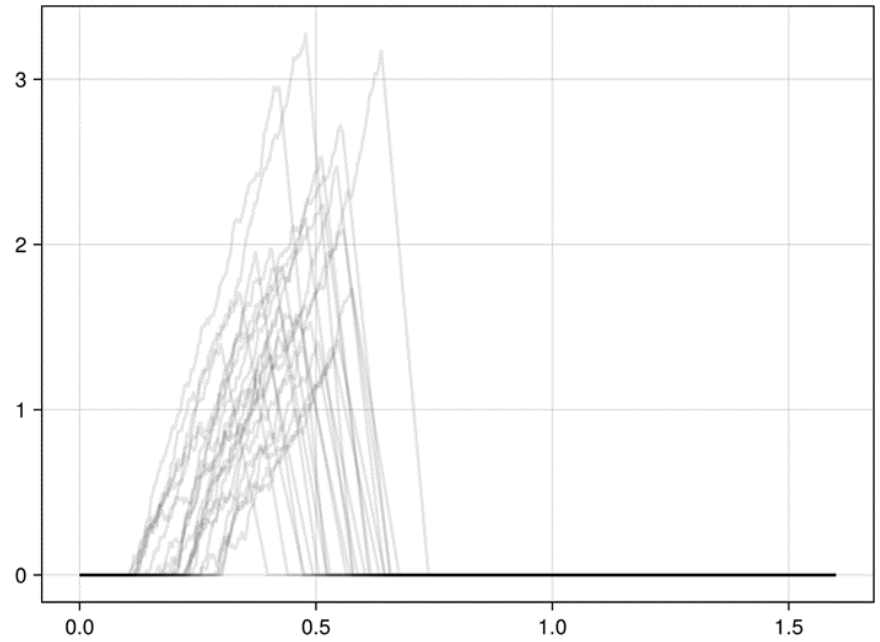
Kelly et al. Neurophysiology of Human Perceptual Decision-Making 2021 [1]

Kelly et. al Model of neural activity in Julia

- Reference Paper: Kelly et al. “Neurocomputational mechanisms of prior-informed perceptual decision-making in humans” 2021 [2]
  - With Matlab Code for SSM to ERP Simulation
  - Rough translation from Matlab Code to Julia

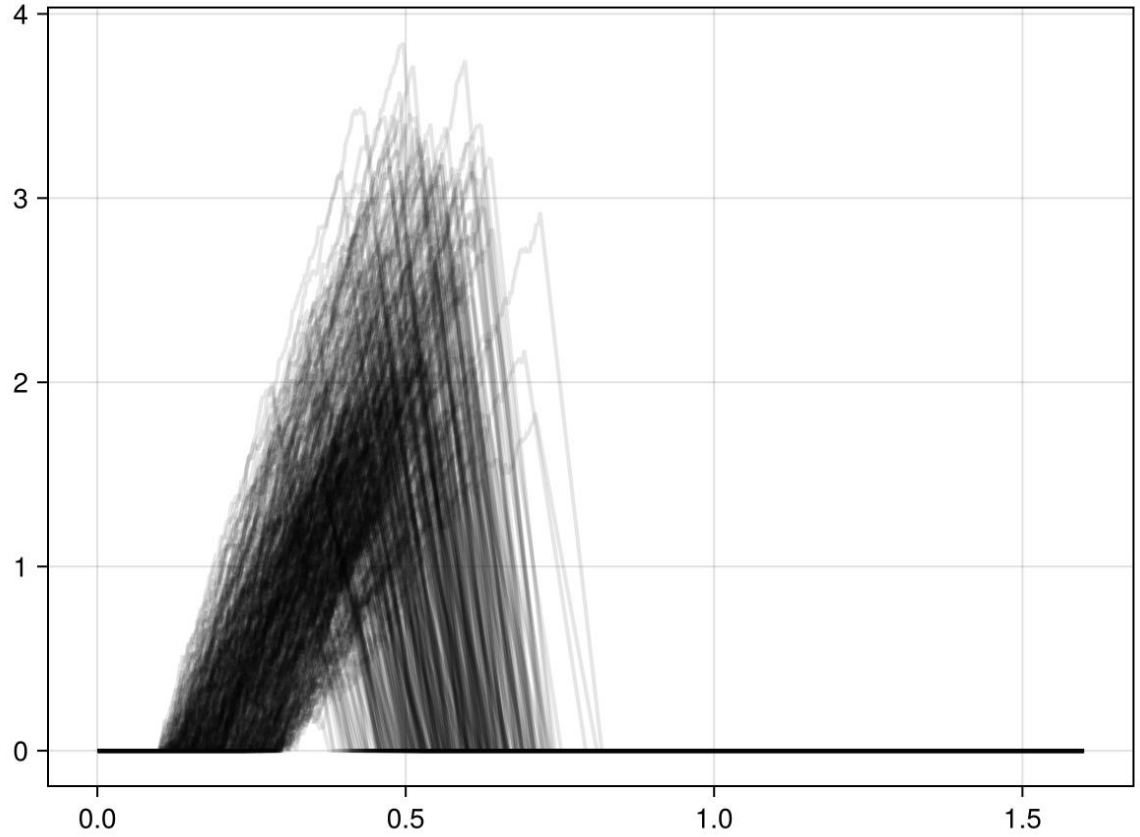


Own illustration based on Kelly et al. Code converted to Julia

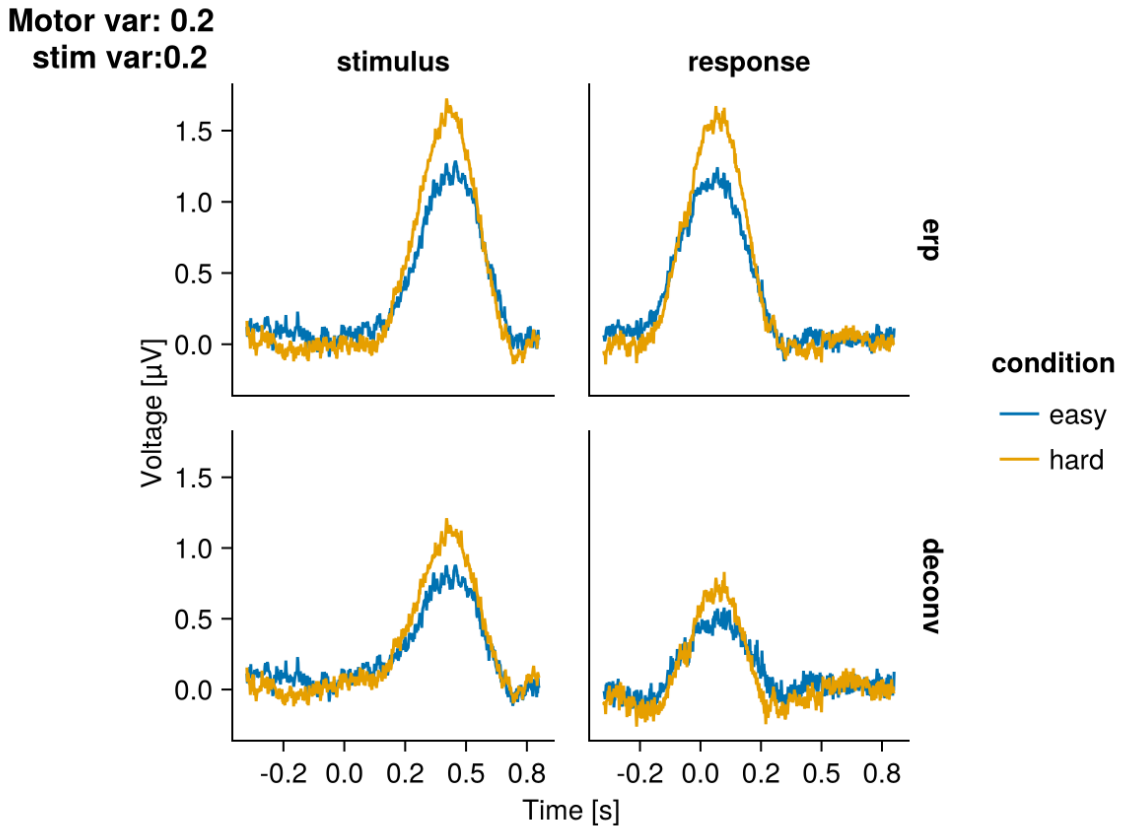


Own illustration based on Kelly et al. Code converted to Julia

Kelly et. al Model of neural activity in Julia



Own illustration based on Kelly et al. Code converted to Julia



Own illustration based on Kelly et al. Code converted to Julia

Goals

1. Theoretical Description of Sequential Sampling Models (SSMs)
    1. For example the drift-diffusion model (DDM) and the linear ballistic accumulator (LBA)
2. Reimplementation of the Kelly Model [2]
3. Integration into UnfoldSIM [3]
4. Comparison of Models
    1. systematic comparison of different SSMs by varying key parameters
    2. Identify potential indicators of the neural mechanisms behind evidence accumulation

Schedule

Timeline between 15.10. until 15.04.

1. Proposal Phase
2. Basic Literature Search and Theoretical Model Description
3. Programming of Simulations
4. Simulation and Comparison of Models
5. Review and Presentation

Writing the Thesis is a constant process

Literature

[1]: Redmond G. Connell and Simon P. Kelly. Neurophysiology of human perceptual decision making. Annual Review of Neuroscience, 44(Volume 44, 2021):495–516, 2021.

[2]: Simon Kelly, Elaine Corbett, and Redmond O'Connell. Neurocomputational mechanisms of prior-informed perceptual decision-making in humans. Nature Human Behaviour, 5:1 15, 04 2021.

[3]: https://github.com/unfoldtoolbox/UnfoldSim.jl

Questions?

- PS. if you want more information, you can ask me for my proposal