UNIVERSITÄT OSNABRÜCK

Sebastian Musslick
sebastian.musslick@uos.de,
Institute of Cognitive Science,
Universität Osnabrück

Modeling in Cognitive Science (WiSe 2023/24): Group Project - Experiment 2

Version 1.0 (January 30th, 2024)

Experiment: https://younesstrittmatter.github.io/rdkOnline/

Credit: Younes Strittmatter (Brown University)

Task Description

This experiment implements a task-switching paradigm. In this task, participants are asked to react to the orientation or to the movement of triangles.

Each trial of the experiment begins with the display of a fixation cross. If the cross is yellow, participants have to react to the orientation of the triangles. If it is blue, they have to react to the movement of the triangles.

Participants have to press the "F" key with their left hand to indicate orientation or movement to the right. They have to press the "J" key with their right hand to indicate orientation or movement to the left.[1]

The experiment includes a training block but the data will only be provided for the test block.

If you want to learn more about this task, have a look at the following article: https://link.springer.com/article/10.3758/s13428-021-01767-3.

Modeling Directions

There are lots of phenomena that may be worth exploring in the task. For instance, participants are expected to react slower if the orientation of the dots is incongruent with

[1] Note that in a previous version of the experiment, there was an error in the instructions, swapping left and right hands.

their movement (e.g., 0 degree vs. 180 degree). They may also be slower if the task switches vs. repeats. The following experimental variables may be of interest:

- `task_type`: Which task is performed (`mov`: movement; `or`: orientation).
- `coherent_movement_direction`: Stimulus movement direction (`0`: right; `180`: left)
- `coherent_orientation_direction`: Stimulus orientation (`0`: right; `180`: left)
- `congruency`: Alignment between orientation and movement (`congruent`: movement = orientation; `incongruent`: movement $\neq$ orientation).
- `task_transition`: Whether the task has repeated or switched with respect to the previous trial (`repetition`: task repeated; `switch`: task switched)

There are many ways to model this task, depending on the phenomenon you pick. E.g., you may choose to model this task using a sequential sampling model as described in Problem Set 4. Here, you may want to explore whether the `task_transition` has an effect on the drift rate or threshold. This could be done by coding the task transition `0: repetition; 1: switch`. One could then formulate a drift rate regression model, e.g., describing the drift rate as follows:

```
v   1 + task_transition
```

This model would test if the task transition would have an influence on processing efficacy. Alternatively, we could examine whether the task transition has an influence on threshold:

```
a   1 + task_transition
```

Again, these are just two example models, based on the sequential sampling approach. Feel free to pick any other phenomenon or modeling method you find suitable.