

Psychology of Information Processing

Prof. Constantin Rothkopf, PhD

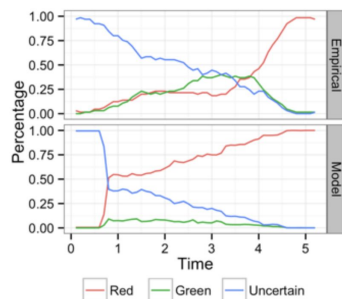
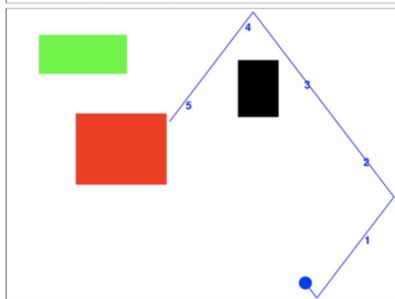
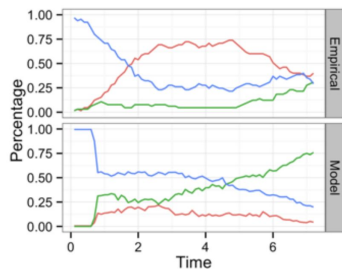
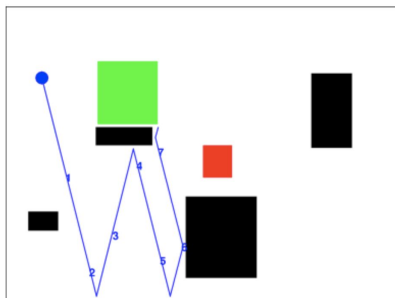




Members



Eye movements in intuitive physical reasoning



Kevin Smith, MIT

Can we relate predictions of **intuitive physical reasoning** to the information people sample with their **gaze**?

The red-green-task: Participants are asked to make ongoing predictions about the destination of a simulated ball moving on a 2D bumper table.

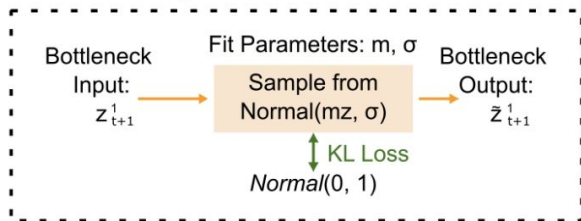
Project: Track people's eye movements while watching the simulations unfold. Relate the locations of gaze to the uncertainty in predictions by an intuitive physical reasoning model. This is in collaboration with Kevin Smith.



Constantin Rothkopf
constantin.rothkopf@tu-...

What do disentangled RNNs actually do?

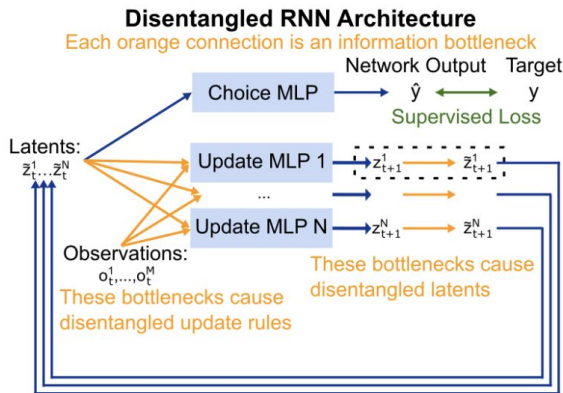
Example Information Bottleneck



Disentangled RNNs are neural networks that include **information bottlenecks** that constrain the dimensionality of variables in the internal representations.

These networks have been used to model behavior in a variety of rewarded tasks showing more “**human-like**” behaviour than full blown RNNs without bottlenecks.

Project: Implement a sequence of parametric disentangled RNNs and train them on the same tasks. Use ML methods developed in our lab to understand, how bottlenecks actually change representations.

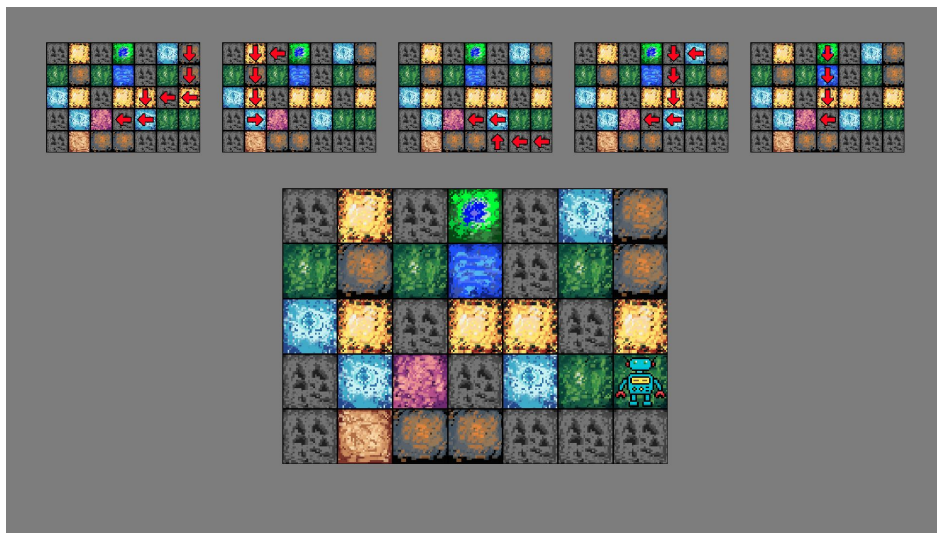


Constantin Rothkopf
constantin.rothkopf@tu-...

Policy Summarization in different task environments



TECHNISCHE
UNIVERSITÄT
DARMSTADT



I am interested in how models for human inference from policy summaries (inverse reinforcement) need to be adapted based on task features.

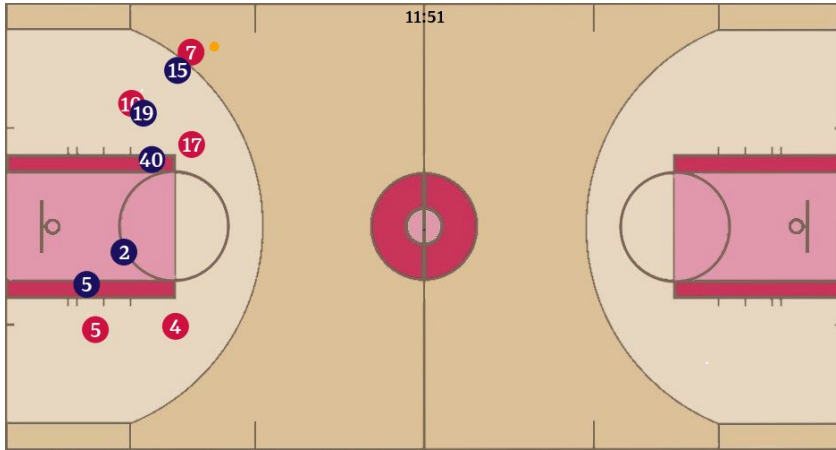
Project: Adapt existing experimental code to test new conditions, record and analyze new data (eye-tracking and click data)

Of course, there are other projects available. Write me an email if you are interested!



Inga Ibs
inga.ibs@tu-...

Eye movement behavior in natural dynamic environments



I am interested in the **decision process** that drives our **eye movements**, especially in **natural environments**.

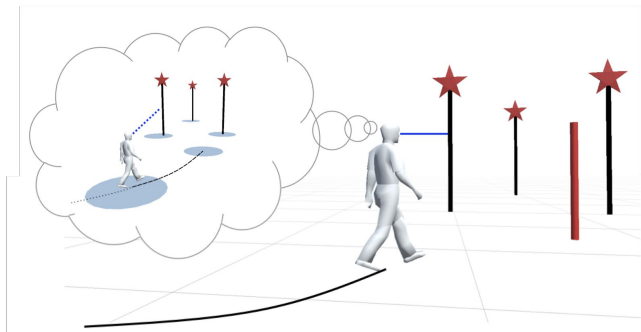
Project: Record eye tracking data using similar stimuli to the one on the left. Afterward, analyze and model the resulting behavior.

Other projects are possible too, just write me an email!



Tobias Thomas
tobias.thomas@tu-...

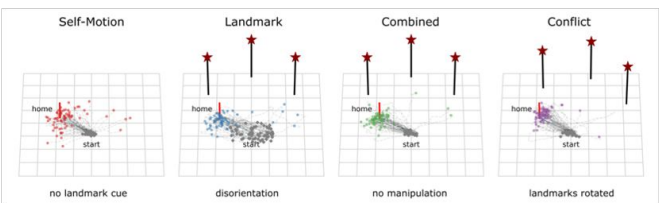
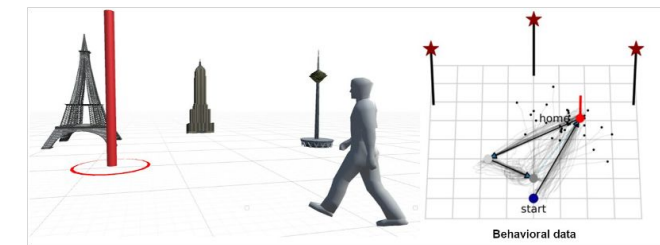
Experiments and models of human spatial navigation



Goal-directed navigation requires integrating information from a variety of internal and external cues, representing them internally and planning and executing motor actions sequentially.

How do humans strategically use gaze behavior during exploration of an environment? How does human navigational variability arise?

Project: set up and perform navigation experiment in VR, analyze navigation and eye-tracking data, apply computational model of goal-directed navigation



Fabian Kessler
fabian.kessler@tu-...

Gaze analysis in the natural task of pouring liquids



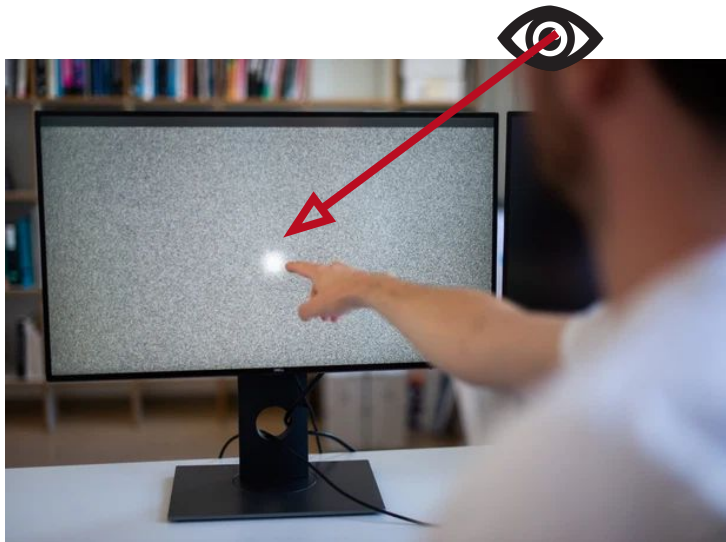
Project: Using the existing pouring data and building upon the preliminary gaze analysis already conducted, the goal is to explore and validate compelling hypotheses.

Other potential projects within the context of the pouring experiment possible too.



Niteesh Midlagajni
niteesh.midlagajni@tu-...

Eye movements in continuous psychophysics tracking tasks



Continuous psychophysics **tracking tasks** have been performed with hand and eye movements.

Less is known about how **hand and eye movements are coordinated** during tracking.

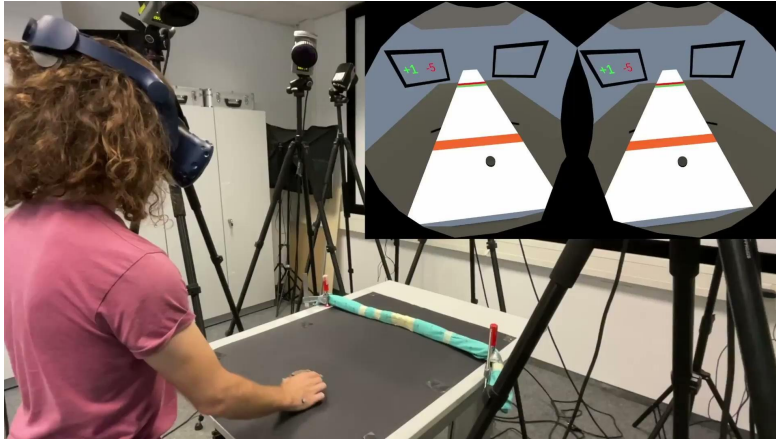
Project: take existing experiment code, integrate eye tracker, record data, analyze (& computational model)

Other projects available too, just write me an email!



Dominik Straub
dominik.straub@tu-...

Decision-making in everyday scenarios



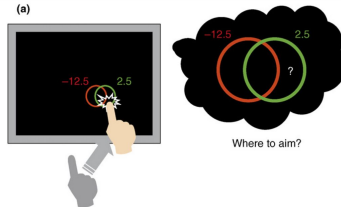
I am interested in the combination of **Intuitive Physics**, **Sensorimotor Control** and **Economic Decision-Making**

If you have ideas within those fields, just write me an email!

Project: Compare decision-making across different existing tasks



Sliding Pucks



Finger Pointing

A: 50% chance to win 1,000,
50% chance to win nothing;

B: 450 for sure.

Classic Economic
Decision-Making



Fabian Tatai
fabian.tatai@tu...



TECHNISCHE
UNIVERSITÄT
DARMSTADT

