

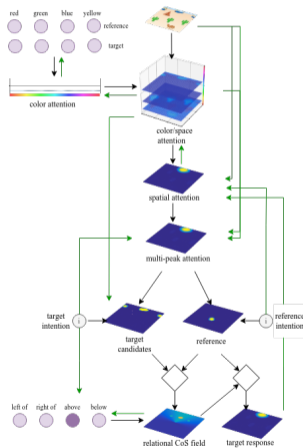


INSTITUT
FÜR
NEUROINFORMATIK

Projects

Neuronal Dynamics for Embodied
Cognition 2023

Generating a scene description containing object features and relations

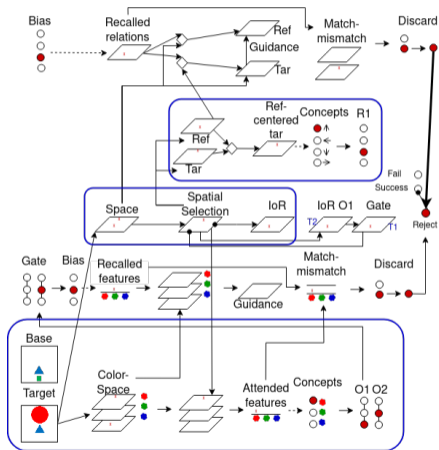


Build an architecture that can generate a conceptual description of the scene by selecting two objects and extracting their color values and spatial relation between them

Extend the architecture built in exercise 3 (grounding spatial language)

As the first step, make the architecture select an object by saliency and extract the color value of the selected object

Visual analogy making between scenes containing a pair of objects

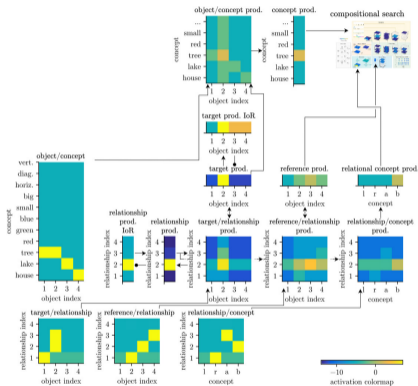


Build an architecture that can make analogies between scenes containing two objects based on the shared relation

The description sub-network (in the blue square) will be given as a template

As the first step, extend the architecture to guide the selection of the reference role object in the target scene by using the extracted color value

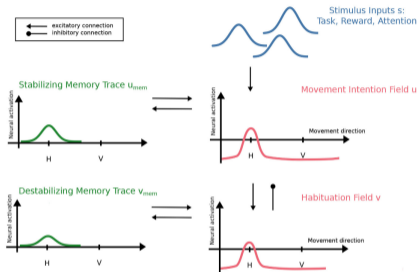
Toward higher cognition: Case study in grounding nested phrases



Build an architecture that can ground nested phrases like “The ball approaches the tree which is at the lake” or “The ball approaches the tree which is to the right of the house and to the left of the lake”

Requires extending the architecture built in exercise 3 (grounding spatial language) by a mechanism to encode structural dependencies among phrases and guide grounding processes in accordance with that structure

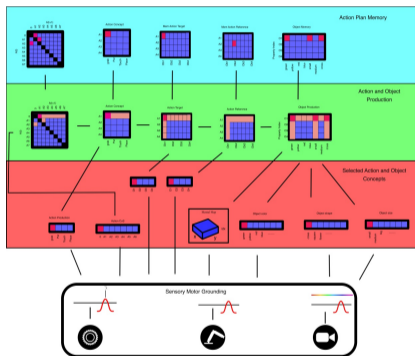
Habituation and Dishabituation signatures in motor behavior



This project involves both qualitative replication and potential expansion of work on signatures of (dis-) habituation that are found in psychometric experiments in motor behavior. The students will have to design their own experiment (experimental phases, stimulus sequences, ...) in Cedar and have to analyze the gathered data.

Optionally, students can connect their architecture to the Caren Robot in Webots. They are provided with template files that help with controlling robot simulation.

Seeking behavioral flexibility through an Action Grammar



This project builds on your gained knowledge of sequence generation and grounding of nested phrases in DFT. Here, you will work on a Conceptual Structure that allows to represent simple imperative Action Phrases such as „Pick up the red box“. Your model is tested out on a virtual robot arm implemented in the Webots software.

The conceptual structure should allow to bind multiple action phrases into a fixed sequence, such as: „First, pick up the red box. Then, place it on the blue box.“ In case of interest, this work can be extended in many directions.

