

Neural Dynamic Principles for an Intentional Agent

Stephan Sehring

Based on: Tekülve and Schöner, 2024

Institute for Neural Computation, Ruhr-University Bochum



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Intentionality

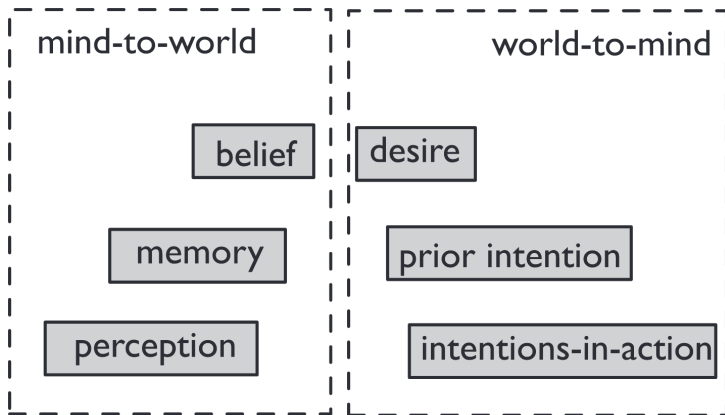


Figure: Six modes in two directions of fit (Searle, 1983).

Robot Painting Task

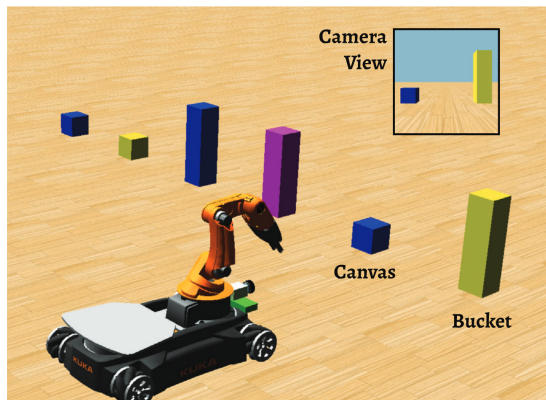


Figure: Simulation Environment

Architecture

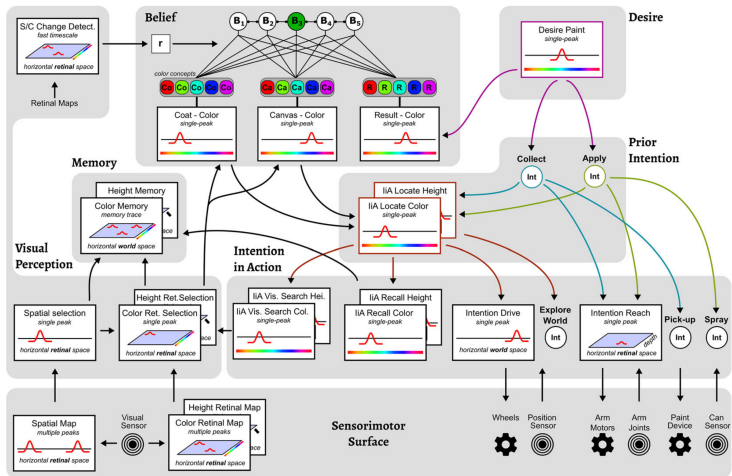


Figure: Neural Field Architecture

Belief Network

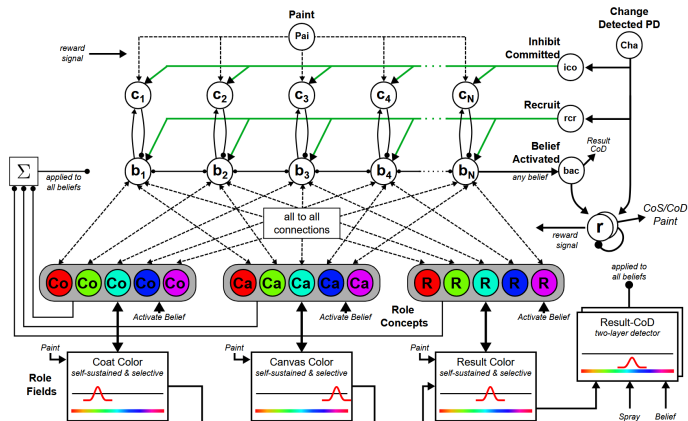


Figure: Belief Network (Tekülve, 2021) inspired by Adaptive Resonance Theory (Carpenter and Grossberg, 1987)

Learning

Recall

Sequence Generation

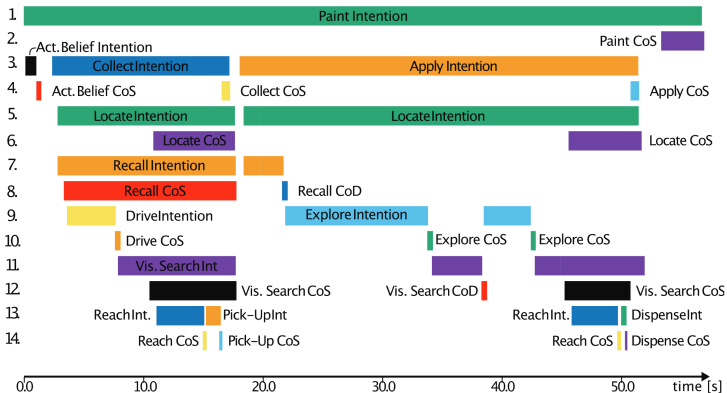


Figure: Temporal Structure of Goal-Directed Sequences.

Takeaways

- ▶ Intentionality serves as a scaffold for structuring neural dynamics in autonomous agents.
- ▶ Stability—and transitions—between intentional states drive goal-directed behavior sequences.
- ▶ Online learning is enabled by event-driven associative memory.

- Carpenter, G. A., & Grossberg, S. (1987). A massively parallel architecture for a self-organizing neural pattern recognition machine. *Computer Vision, Graphics, and Image Processing*, 37(1), 54–115.
[https://doi.org/https://doi.org/10.1016/S0734-189X\(87\)80014-2](https://doi.org/10.1016/S0734-189X(87)80014-2)
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- Tekülve, J. (2021). *A neural process model of intentionality implemented on an autonomous robot*.
- Tekülve, J., & Schöner, G. (2024). Neural Dynamic Principles for an Intentional Embodied Agent. *Cognitive Science*, 48(9), e13491.
<https://doi.org/10.1111/cogs.13491>