

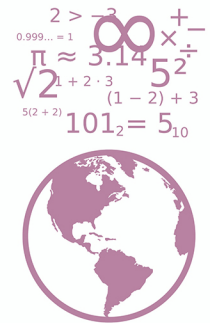
From Embodied Predictive Processing to Higher Cognition: Grounded Cognition & Conceptual Spaces

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Life-Mind Continuity in Higher-Level Cognition

- Free-Energy Principle: All living systems are/have a model of their world¹
- Cognition is product of anticipatory world model (small-scale mental world)
- Prediction-error minimization underlies all perception, action, cognition
- No account for higher-level cognition under predictive processing



Some theories of cognition can account for higher-level cognition

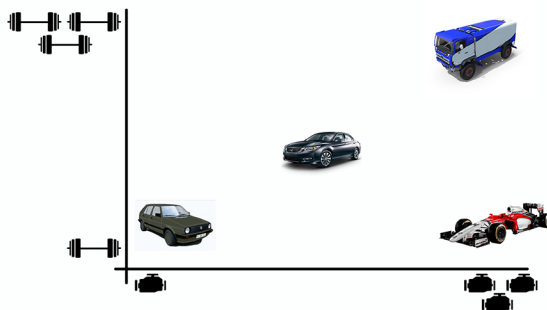
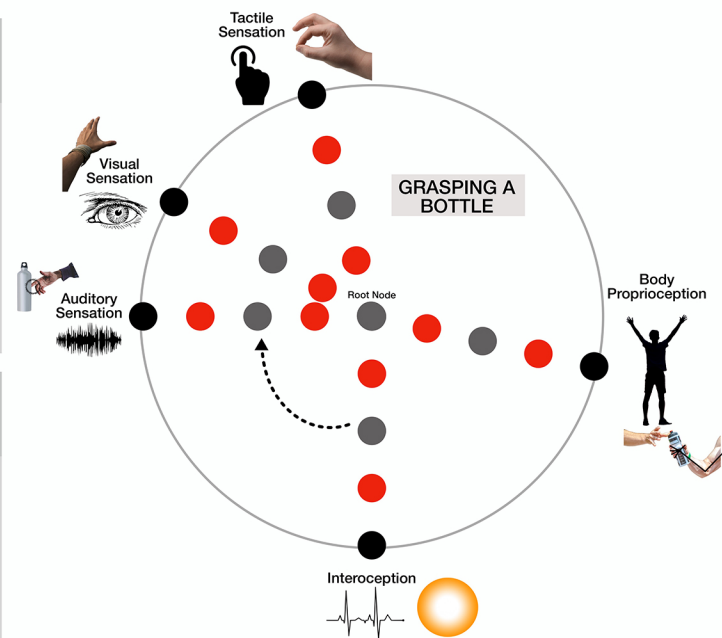
→ Integration

Words as Social Tools (Borghi, Clark, Lupyan)

- Language as Glue (connecting unrelated percepts)²
- Language as Tools (performing action)
- Precision-Weighting in Hierarchical Generative Model
- Makes the mind 'programmable'

Metaphoric Mapping (Barsalou, Lakoff, Johnson)

- Simulation as concept representation (simulators or root node)
- Concrete domain is used to represent abstract concept³
- "The meeting on wednesday is moved two days forward"



Conceptual Spaces (Gärdenfors, Doeller, Moser)

- Concepts and relations represented with space
- Quality dimensions
- Generates "Semantic Maps"⁴
- Foraging in conceptual spaces

This integration paints a specific, coherent picture of higher-level cognition under predictive processing

"Thinking is Restrained Speaking or Acting" - Bain (1868)⁵

- Integration of many lines of research (incl. S-Reps)⁶
- Aligns with cybernetic, life-mind continuity, approaches
- Predictive processing becomes specific
- Grounded cognition is integrated with other fields
- Simulations involving small-scale detached models
- simulations of conceptual spaces,
 - with words as tools
 - metaphorical use of actions/perception

Organisms become a model, have a model, detach a model, exapt the model

1 - Friston, K. J. (2013). Life as we know it. *Journal of The Royal Society Interface*, 10(86), 20130475.

2 - Borghi, A. M., & Binkofski, F. (2014). *Words as Social Tools: An Embodied View on Abstract Concepts*. Springer New York.

3 - Lakoff, G., & Johnson, M. (1980). The Metaphorical Structure of the Human Conceptual System. *Cognitive Science*, 4(2), 195-208.

4 - Bellmund, J. L. S., Gärdenfors, P., Moser, E. I., & Doeller, C. F. (2018). Navigating cognition: Spatial codes for human thinking. *Science*, 362(6415).

5 - Bain, A. (1868). *The Senses and the Intellect*. Adamant Media Corporation.

6 - Williams, D. (2018). Predictive processing and the representation wars. *Minds and Machines*, 28(1), 141-172.