

## Preface

The role of physical embodiment in cognition has long been the subject of debate. It is largely accepted in AI that embodiment has strong implications on the control strategies for generating purposive and intelligent behavior in the world. Some theories have proposed that embodiment not only constrains but may also facilitate certain types of higher-level cognition. Evidence from neuroscience allows for postulating shared mechanisms for low-level control of embodied action (e.g., motor plans for limb movement) and higher-level cognition (e.g., abstract plans). Work in animal behavior has also addressed the potential links between the two systems and linguistic theories have long recognized the role of physical and spatial metaphors in language.

This symposium studies the role of embodiment in both scaling up control and grounding cognition. We explore ways of extending the existing typically low-level sub-cognitive systems such as autonomous robots and agents, as well as grounding more abstract typically disembodied cognitive systems. In that effort we draw from AI, ethology, neuroscience, and other sources in order to focus on the implications of embodiment in cognition and action, and explore work that has been done in the areas of applying physical metaphors to more abstract higher-level cognition.

Topics and questions of interest include:

- What spatial metaphors that can be used for abstract/higher-level cognition?
- What non-spatial metaphors can be applied in higher-level cognition?
- What alternatives to symbolic representations (e.g., analogical, procedural, etc.) can be successfully employed in embodied cognition?
- How can evidence from neuroscience and ethology benefit work in synthetic embodied cognition and embodied AI? Can we gain more than just inspiration from biological data in this area? Are there specific constraints and/or mechanisms we can usefully model?
- (How) Do methods for modeling embodied insect and animal behavior scale up to higher-level cognition?
- How do metaphors from embodiment apply to everyday activity?

- What computational and representational structures are necessary and/or sufficient for enabling embodied cognition?
- What are some successfully implemented embodied cognition systems?

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