

ABSTRACT COVER PAGE

**Scaling Up of Action Repertoire in Linguistic
Cognitive Agents**

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Recent research in autonomous cognitive systems has focused on the close integration (grounding) of language with perception and other cognitive capabilities [1,2,5]. In this paper we propose the utilization of the Modeling Field Theory (MFT) [6] to deal with the combinatorial complexity problem of language modeling. MFT aims at overcoming such limitations by dynamic logic learning of lower-level signals (e.g., inputs, bottom-up signals) with hierarchies of higher-level concept-models (e.g. internal representations, categories/concepts, top-down signals). This is the case of language, which is characterized by the hierarchical organization of underlying cognitive models [4,7].

In this paper we present an integration of the Modeling Field Theory algorithm for the classification of objects [3] with a model of the acquisition of language in cognitive robotics. In new simulations we have applied and extended our previous modified version of the MFT algorithm [8] to deal with the scaling up of the robotic agent's action repertoire. Simulations are divided into two stages. First agents learn to classify 112 different actions inspired by an alphabet system (the semaphore flag signaling system). In the second stage, agents also learn a lexical item to name each action. At this stage the agents will start to describe the action as a "word" comprised of three letters (consonant - vowel - consonant). The outcome of the simulations is that: (i) agents are able to acquire a complex set of actions by building sensorimotor concept-models; (ii) agents are able to learn a lexicon to describe these objects/actions through a process of cultural learning.

Ongoing research is focusing on the further scale up of the model to include a more diverse selection of lexical entries and actions. Action patterns will be initially broken down into basic primitive gestures. This will also allow the agent to progressively learn how to combine basic gestures into composite action via language and grounding transfer.

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