

**A Neuro-Robotics Model for the Acquisition of Higher Order Concepts
in Action and Language**

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Recent neurophysiological experiments have shown that motor neurons responsible for encoding specific motor acts present different activation patterns according to the final goal of the action sequence in which that particular motor act is embedded (Fogassi et al., 2005). This is consistent with the chain model hypothesis (Chersi et al., 2006) according to which the processing of action-related sentences involves the activation of the sequence of motor neurons (chain) directly involved in the sentence.

We have developed a cognitive robotic model for the learning of compositional actions from combination of motor primitives. This model uses recurrent neural networks. Simulation results have shown that motor primitives have different activation patterns according to the action's sequence in which they are contained. These results suggest that the motor chain hypothesis (Chersi et al., 2006) can be a general mechanism that explains the way in which recurrent networks represents and reuse hierarchical concepts.