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Chapter VII

On Agent Societies

Abstract

In this chapter we propose a model for a multi-agent society, based on expectancy and interaction. Based on results on imitations, we proposed a multi-agent version of the Interactivist-Expectative Theory of Agency and Learning (IETAL) theory—Multi-agent Systems in Interactive Virtual Environments (MASIVE).

Introduction

The Petitagé-like agents inhabit the same environment and interact with each other using imitation. The drive to imitate is the highest on the hierarchy of drives of all agents. After the convention of two agents, they interchange their contingency tables and continue to explore the environment. The problems associated with the imitation stages and the changes in the agents can be observed from different angles.

Imitation Revisited

In this section we summarize relevant results from research from neurophysiology and psychology applicable in the domain of imitation, in our approach towards the modeling of the multi-agent society. This approach is justifiable by the efforts towards a more efficient learning paradigm in agents with the embodied mind paradigm.

The concept of learning by imitation (learning by watching, teaching by showing) is certainly not a new one. Thorndike (1898) defines it as "[imitation is] learning to do an act from seeing it done," whereas, Piaget (1945) mentioned it as a major part when offering his theory for development of the ability to imitate going through six stages.

The discovery of neonatal imitation (Maratos, 1973; Meltzoff & Moore, 1977) changed a few takes on the phenomenon of imitation. Piaget later demonstrates that imitation cannot be a purely cognitive process that appears at the end of the first year; rather it has an innate interpersonal function. The interpersonal function of imitation was first studied in Maratos (1973) in the context of early interaction. Infant imitations selectively elicited by humans, but not by objects (Legerstee, 1991) has become the laboratory criterion of social responsiveness.

Nagy and Molnar (2004) state that neonatal imitation:

… is defined as various facial, hand, and finger movement and vocalizations made by a young infant to show orientation, attention, learning, effort and motivation when reproducing the previously modeled movements or sounds, many of which are quite unnatural or artificial. Neonatal imitation is one of the many highly complex social skills and preferences that constitute and inborn intersubjectivity; including emotional expressions, preference for humanlike faces, and extremely rapid learning of vital clues from the mother's body or how to identify her voice, face or odor.

Neonatal imitation is where the nonverbal protoconversation start. What carries this protoconversations? A variety of ethological studies that demonstrate:

Several complex human behavioral patterns are universal, including basic patterns of communication and basic facial emotion expressions, Children who are born blind from birth are able to express a complex emotional expression… That basic emotional expressions are not only universal, but also innate…. Human neonates also show visual preference toward human faces, directing attention to face-like patterns as compared to non face-like stimuli or to scrambled faces.