# MASTER'S THESIS

## Multi-level behavioral self-organization in computer-animated lifelike synthetic agents

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# Multi-Level Behavioral Self-Organization in Computer-Animated Lifelike Synthetic Agents

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# Abstract

In dealing with real-life problems, traditional artificial intelligence (AI) systems are becoming increasingly complex. Sometimes, it is very difficult or even impossible to manually design, develop, and maintain them. As an alternative, other methods such as autonomous agent methods may be applied. The key idea behind the agent methods is that they solve problems in a bottom-up, adaptive fashion with the capabilities of self-learning and evolution under certain task criteria.

This thesis presents an autonomous agent-based approach to computer animation. It focuses on the task of enabling computer-animated characters to acquire lifelike behaviors, which are, to humans, reasonable and believable. Specifically, this approach, called Multi-Level Behavioral Self-Organization (MUSO), utilizes an inter-threaded motif-based behavioral organization architecture (or the motif architecture for short). As originally proposed and demonstrated in [18, 19], the new approach enables the behaviors of an agent to be concurrently organized with various motifs of interacting processes. The organization at each motif is concerned with one specific objective. Based on the MUSO approach, we have developed a three-dimensional graphical software package, and demonstrated the effectiveness of the MUSO approach in the concurrent self-organization of a synthetic agent's believable behaviors in a virtual environment.

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