



Chapter V

Emergence of Creativity: A Simulation Approach

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Abstract

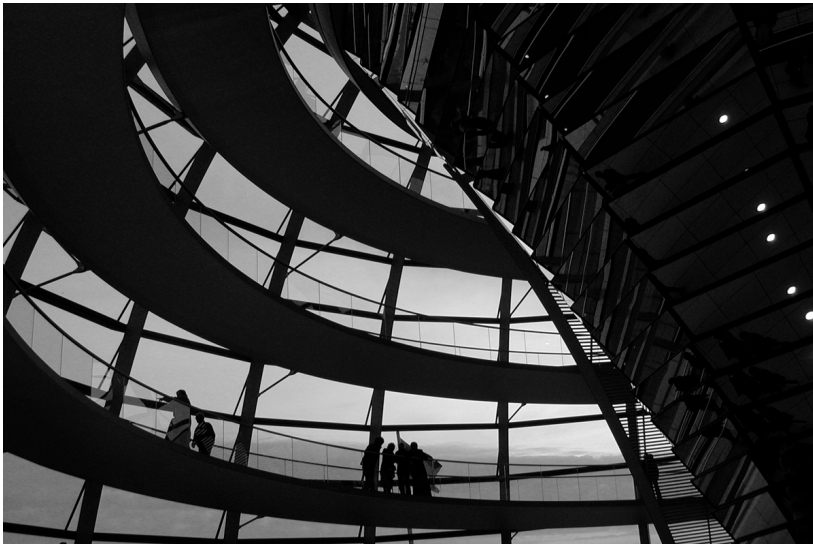
This chapter presents a theory of natural creativity and its relation to certain features of intelligence and cognitive faculties. To test the theory we employ simulated worlds of varying complexity, inhabited by creatures with a genetically-evolving mental model. Plan-making strategies are compared between creatures in each of these worlds. The results show that creative behaviors are governed by the world's structural coherence and complexity. In light of the results we present a new definition of creativity, propose a theory for why creativity evolves in nature, and discuss creativity's relation to perception, goals, logic, understanding, and imagination. Creativity has been a difficult concept to define and its exact relationship with intelligence remains to be explained. The theoretical framework presented is proposed

as a foundation and tool for furthering understanding of natural creativity and to help develop creative artificially intelligent systems.

Introduction

Creativity is an important capability of humans. It gives us power beyond the reach of any other intelligent system known and separates us from the rest of the animal kingdom. Through creativity, the human race has learned to build complex technology far beyond that of any other species on this planet (Figure 1). Although creativity is an enormously important aspect of our existence, few artificial intelligence (A.I.) studies have been directly aimed at understanding the general underlying structure, or nature, of creativ-

Figure 1. Architectural constructs are perhaps not considered prime examples of creative output, yet are based on numerous creative insights without which they would not exist. Compared to some of the structures considered very creative in the animal kingdom, such as bird nests or ant-hills, the difference of creative capacity is obvious.



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