Chapter 1

Parachemistry of Mind:
Case Studies of Doxastic and Affective Mixtures

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Abstract

We portray mind as an imaginary chemical reactor, where discrete entities of emotions and beliefs diffuse and react as molecules. We discuss two models of mind: a doxastic solution where quasi-chemical species represent knowledge, ignorance, delusion, doubt, and misbelief; and an affective solution, where reaction mixtures include happiness, anger, confusion, and fear. Using numerical and cellular-automaton techniques, we demonstrate a rich spectrum of nontrivial phenomena in the spatiotemporal dynamic of the affective and doxastic mixtures. This paradigm of nonlinear medium-based mind will be used in future studies in developing intelligent robotic systems, designs of artificial organic creatures with liquid brains, and diffusive intelligence of agent collectives.
Introduction

In this chapter, we crossbreed distributed concepts of mind (Minsky, 1988), theories of contagion of knowledge and emotions (Dawkins, 1976; Hatfield et al., 1994), swarm intelligence and collective pattern formation (Bonabeau et al., 1999), artificial chemistry (Dittrich et al., 2001), unconventional computing (Adamatzky, 2001), physical models of consciousness (Hameroff, 2001), and emotional intelligence (Goleman, 1996) to develop a nonlinear media-based representation of mind, thus building a bridge between conventional understanding of mind, dynamical psychology (Abraham & Gilgen, 1995), and sociophysics (Stauffer, 2003).

We model mind as a massive pool of simply interacting primitive entities, with spatiotemporal dynamics that reflect inner processes of interaction of affective and cognitive systems. We design, experiment with, and study chemical-like models of collectives of simply interacting affective and cognitive entities. Two models are considered here. An affective mixture, which represents happiness, anger, confusion, and fear as diffusing and reacting chemical species; and a doxastic mixture, where the reagents are knowledge, ignorance, delusion, doubt, and misbelief. These two types of mixtures are isolated from each other; no interaction between affective and doxastic components is discussed in the chapter. This isolation gives us an opportunity to look at a mind dissected into emotional and belief constituents. We derive several scenarios of quasi-chemical doxastic and affective reactions that exhibit nontrivial behaviour. We study global dynamic reagent concentrations in stirred reactors, where entities can interact at any distance; and spatial dynamics in thin-layer reactors, where entities almost do not move, and thus form a regular structure of locally interacting sites. We demonstrate that, depending on the particular architecture of reactions in doxastic and affective solutions, complex regimes of spatiotemporal dynamics can be observed, namely travelling waves, breathing domains, ordered patterns, and chaotic processes. The findings are substantiated by psychological correlates to indicate possible ways of mastering mind via controlling reaction mechanisms between doxastic and affective species.

Nonlinear Minds

Mathematical, computing, and physical sciences based approaches to the study of social and mental dynamics has a long, successful history. It probably started as early as 1940, when Jerome Lettvin and Walter Pits (Lettvin & Pits, 1943) designed a differential equation model of mental disorders. Their model repre-
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