

Chapter 1

Introduction

One of our goals in this book is to relate the following diverse topics:

- a generalization of finite group theory which includes finite semi-groups and finite state automata;
- a reasonable, precise and useful definition of *complexity* of organisms and machines;
- a mathematical theory of physics and/or biology for the case in which models are applicable with nonlinear but finite phase spaces. Our theory will give rise to the following: relations between the Darwinian theory of evolution, the complexity of the evolved organisms and the Mendelian genetics;
- a definition of a global (generalized) Lagrangian from which the philosophy of Thom's program for studying morphogenesis (i.e., the origin, development, and evolution of biological structures) via the topological methods of the theory of structural stability (à la Smale, Thom, etc.) might begin;
- a Mendeleev type table for the classification of biological reactions (e.g., bacterial intermediary metabolism) isomorphic to the classification scheme (à la Dickson, Chevalley, Thompson, etc.) for simple non-abelian groups (SNAGs);
- a mathematical theory of personality including a definition of emotion which synthesizes the ideas of S. Freud and R. D. Laing;
- a theory of complexity for certain games (in the sense of von Neumann) which includes Chess, Checkers, Go, etc.

We will proceed from standard mathematics to non-standard mathematics and then to applications, generalities and possible applications.