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universes themselves as generators of physical invariances; 1.3.5 Physical causality and mathematical symmetry
1.3.6 Towards the "cognitive subject"Chapter 2 Incompleteness and Indetermination in Mathematics and Physics; Introduction; 2.1 The Cognitive Foundations of Mathematics: Human Gestures in Proofs and Mathematical Incompleteness of Formalisms; 2.1.1 Introduction; 2.1.2 Machines, body, and rationality; 2.1.3 Ameba, motivity, and signification; 2.1.4 The abstract and the symbolic; the rigor; 2.1.5 From the Platonist response to action and gesture; 2.1.6 Intuition, gestures, and the numeric line; 2.1.7 Mathematical incompleteness of formalisms; 2.1.8 Iterations and closures on the horizon
2.1.9 Intuition2.1.10 Body gestures and the "cogito"; 2.1.11 Summary and conclusion of part 2.1; 2.2 Incompleteness, Uncertainty, and Infinity: Differences and Similarities Between Physics and Mathematics; 2.2.1 Completeness/incompleteness in physical theories; 2.2.2 Finite/infinite in mathematics and physics; Chapter 3 Space and Time from Physics to Biology; 3.1 An Introduction to the Space and Time of Modern Physics; 3.1.1 Taking leave of Laplace; 3.1.2 Three types of physical theory: Relativity, quantum physics, and the theory of critical transitions in dynamical systems
3.1.3 Some epistemological remarks3.2 Towards Biology: Space and Time in the "Field" of Living Systems; 3.2.1 The time of life; 3.2.2 More on Biological time; 3.2.3 Dynamics of the self-constitution of living systems; 3.2.4 Morphogenesis; 3.2.5 Information and geometric structure; 3.3 Spatiotemporal Determination and Biology; 3.3.1 Biological aspects; 3.3.2 Space: Laws of scaling and of critical behavior. The geometry of biological functions; 3.3.3 Three types of time; 3.3.4 Epistemological and mathematical aspects; 3.3.5 Some philosophy, to conclude
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Sommario/riassunto

This book identifies the organizing concepts of physical and biological phenomena by an analysis of the foundations of mathematics and physics. Our aim is to propose a dialog between different conceptual universes and thus to provide a unification of phenomena. The role of "order" and symmetries in the foundations of mathematics is linked to the main invariants and principles, among them the geodesic principle (a consequence of symmetries), which govern and confer unity to various physical theories. Moreover, an attempt is made to understand causal structures, a central element of physical int