

Contents

1	Introduction: Some Facts About Our Universe	1
	Information as a “Difference that Makes a Difference”	2
	Abstract Knowledge <i>Versus</i> Direct Perception	3
	Distinction and the Directionality of Choice	4
	The Difference Between Animate and Inanimate Matter	7
	References	8
2	Problems of Logical Typing: The “One” and the “Unity”	11
	Confusion of Logical Types Beget Paradoxes	12
	Russell’s Paradox.	13
	Bohr’s Complementarity Principle	14
	Application of the Axiomatic Method to the Real World.	16
	Gödel’s Formal System	17
	Gödel’s Mapping	18
	Analogy Between the Formal System and the Genetic System.	20
	Differences of Logical Typing in the Formal and Genetic Systems.	21
	References	23
3	Logical Typing and the Notion of Time in Biology	25
	Saint Augustine’s Conjecture.	26
	Time as an Interval Between Successive Distinctions	28
	A Little Bit of Evolution Theory	30
	The Essential Biological Unit of Evolution	31
	The Replicator Hypothesis and Errors of Logical Typing	33
	A Little of Methodology	36
	Autopoiesis	37
	References	39

4	Organization of the Genetic System: Proteins as Vehicles of Distinction	43
	Transcriptional Regulatory Network	45
	The Couplon Matrix	46
	Digital and Analog Control of Gene Expression	49
	Two Types of Information in the DNA	50
	DNA Supercoiling	51
	The Role of Supercoiling in Shaping the DNA	53
	Changes of Supercoiling and Digitalization of DNA Transactions	55
	Structural Coupling and Reciprocal Determination	58
	The Spatiotemporal Model of Genetic Regulation	59
	Chromosomal Perception	61
	References	63
5	Harnessing Energy and Information: Time-Irreversibility of Thermodynamics	67
	The Nature of the Second Law	69
	Optimal Cooperation	70
	Organizational Invariance	72
	Thermodynamics of Living Systems	73
	Conversion of Energy into Information in a Sociopolitical System	74
	References	76
6	Social Communications and Logical Typing in the Social System	79
	Language as a Means of Structural Coupling	82
	Similarities Between the Social and Genetic Systems	83
	Shannon Information	86
	Conclusion	89
	References	92

DNA Information: Laws of Perception

Muskhelishvili, G.

2015, VIII, 92 p. 24 illus., 10 illus. in color., Softcover

ISBN: 978-3-319-17424-2