

# Contents

## Part 1

### CONCEPTUAL AND METHODOLOGICAL FOUNDATIONS OF GENERAL SYSTEMS RESEARCH

Progress in General Systems Research . . . . .	3
B. R. Gaines	
Linkage Propositions between Fifty Principal Systems Concepts . . . . .	29
L. R. Troncale	
A Problem-Solving Basis for General Systems Research . . .	53
R. Cavallo and G. J. Klir	
Systems Theoretic Description: A Vehicle for Reconciling Diverse Modelling Concepts . . . . .	61
B. P. Zeigler	
On Being Autonomous: The Lessons of Natural History for Systems Theory . . . . .	77
F. J. Varela	
The Complexity Race . . . . .	85
L. Löfgren	
General System Identification - Fundamentals and Results . . . . .	91
B. R. Gaines	
Constraint Analysis in Structure Modelling: A Probabilistic Approach . . . . .	105
A. P. J. Abrahamse	
Structure Modelling: A Constraint (Information) Analytic Approach . . . . .	117
G. Broekstra	

On Structure Identification of Discrete Time Systems . . .	133
A. S. Zalecka-Melamed and B. P. Zeigler	
Metasystem Identification: A Procedure for Detection and Structural Composition in Time Dependent Systems . . . . .	147
H. J. J. Uyttenhove	
Exploring, Modelling, and Controlling Discrete Sequential Environments . . . . .	161
I. H. Witten	
Managing Complex Systems: An Application of Ensemble Methods in System Theory . . . . .	175
C. C. Walker and A. E. Gelfand	
The Evolution of Organization . . . . .	187
S. Makridakis	
A Mathematical Foundation for System Synthesis . . . . .	209
J. A. Fertig and R. N. Zapata	
On the Decomposition of General Systems: Simulation by Coupling Quotients . . . . .	225
F. Pichler	
Some Esomathematical Uses of Category Theory . . . . .	243
W. Bandler	
A Categorical Approach to General Systems . . . . .	257
S. Ginali and J. Goguen	
Systems as Bimodules . . . . .	271
E. S. Bainbridge	
Lattices of Controllable and Observable Spaces . . . . .	289
P. Zunde	
Results of Empirical Studies in Fuzzy Set Theory . . . . .	303
H. J. Zimmermann	
Building Fuzzy Systems Models . . . . .	313
R. R. Yager	
Basic Cyclic Relators as a Description of Multi- Levelled Systems . . . . .	321
L. Lafrenière, C. Vallet, T. Moulin, H. Le Guyader, and A. Bouhou	

Mobile Systems: Survey . . . . .	337
G. E. Lasker	
System Dynamics Versus Econometrics -- An Approach for Synthesis . . . . .	347
H. Apel, W. Fassing, and W. Meissner	
Absolute Stability of General Systems . . . . .	361
P. M. Salzberg	
Asymptoticity in General Systems . . . . .	371
P. M. Salzberg and P. Seibert	
Normed Networks: Their Mathematical Theory and Applicability . . . . .	381
L. Priese	
The Role of the Observer in Uniform Systems . . . . .	395
T. Toffoli	
The Nature of Fundamentals, Applied to the Fundamentals of Nature . . . . .	401
R. Glanville	
The Whole and the Simultaneous . . . . .	411
C. François and A. Piscitelli	
Ego Development Through Induced Programming . . . . .	419
M. Valach	
Structurally Invariant Linear Models of Structurally Varying Linear Systems . . . . .	435
A. G. Barto	
Stability and Eigenvalue Monotonicity of Linear Systems . .	453
G. M. Engel	
New Approaches to Reduction of Computational Complexity in Signal Processing Systems . . . . .	463
T. A. Kriz	
Synthesis of Complex Control Objects as an Integrated System . . . . .	471
Z. Binder and R. Perret	

## Part II

ADVANCES OF GENERAL SYSTEMS  
RESEARCH IN BIOLOGICAL SCIENCES

Biology and Systems Research: An Overview . . . . .	489
R. Rosen	
Biological Systems Theory: Descriptive and Constructive Complementarity . . . . .	511
H. H. Pattee	
Some Analogies of Hierarchical Order in Biology and Linguistics . . . . .	521
M. Zwick	
Functional Hierarchies in the Brain . . . . .	531
L. J. Kohout	
Controlled Markov Chain Models for Biological Hierarchies . . . . .	545
J. S. Nicolis, E. N. Protonotarios, and I. Voulodemou	
Succinct Representation in Neural Nets and General Systems . . . . .	553
A. M. Andrew	
A Matrix Algebra for Neural Nets . . . . .	563
P. Cull	
Stability of General Systems in Biological, Physical, and Social Sciences . . . . .	575
G. S. Ladde	
The Structural-Functional Analysis of Interbehavioral Systems . . . . .	589
R. D. Ray, J. D. Upson, and B. J. Henderson	
Some Aspects of Analysis Cancer Problems by Means of Control Theory . . . . .	601
W. Duechting	
The Inverse Problem: Computational Algorithms and Their Efficiency with Applications to a Model of the Calvin Photosynthesis Cycle . . . . .	609
J. Milstein	

Could a Model for the Regulation of Ago-Antagonistic Couples be Related to Various Types of Concrete Systems? . . . . .	621
E. Bernard-Weil	
Optimal Ventilation of Critically Ill Patients . . . . .	639
C. J. Maffeo and A. Anné	
Part III	
IMPACT OF GENERAL SYSTEMS RESEARCH ON THE SOCIAL SCIENCES	
Systems Research and Social Sciences . . . . .	655
S. Braten	
Social System Evolution and Sociobiology . . . . .	687
W. Buckley	
General Systems Methodology and Political Science . . . . .	695
R. Cavallo and E. Ziegenhagen	
Systems-Methodology in Management: An Adaptive Procedure for Organic Problem-Solving . . . . .	701
P. Gomez	
A Managerial Problem Solving Methodology (MPSM) . . . . .	711
S. Chakraborty	
A Dynamic Model for Society . . . . .	719
V. H. Brix	
Understanding Supra-Institutional Problems: Systems Lessons Drawn from an Application of the Checkland Methodology . . . . .	735
S. Cornock	
Multi-Organisational Strategies: An Analytical Framework and Case . . . . .	747
R. Espejo	
An Open-System Model of the Corporation . . . . .	763
W. E. Halal	
A Production Planning System Dynamics . . . . .	775
G. Sursal	

Analysis of Investment in Technology Development and Systems with Variable Structure . . . . .	787
B. S. Verkhovsky	
General Systems: A Tool for the Evaluation of the Firm's Potential as a Result of Changes in Its P-M Posture . . . . .	801
H. Tekeli	
Dynamic Control of Hierarchical Public Systems . . . . .	811
M. T. Pavlidou	
The Meaning of Failure as Applied to Human Systems: Characteristics for a Fourth Generation of Systems Methodologies . . . . .	821
J. N. T. Martin	
A Model of the Environment of Organizations: Theory and Evidence of Regulating "Jumpy" F-Sets . . .	831
A. M. Tinker and E. A. Lowe	
System Modeling in Space . . . . .	845
M. Chatterji	
Social Networks and Inter-Systemic Decision-Making . . . . .	859
C. R. Dechert	
Two Separate Realities: Dyadic Communication Problems Resulting from Interpersonal Differences in Internal Complexity . . . . .	873
F. Geyer	
Evolution Strategy and Social Sciences . . . . .	891
H. Krallmann	
A Systems Framework for Library Analysis . . . . .	905
A. M. McMahon and J. Tydeman	
Toward a SIGGS Characterization of Epistemic Properties of Educational Design . . . . .	917
M. L. Estep	
A Curriculum for General Systems Education . . . . .	937
G. A. Mihram and D. Mihram	

## Part IV

## ADVERSE VIEWS TO GENERAL SYSTEMS RESEARCH

Adverse Notes on Systems Theory . . . . .	949
D. Berlinski	
On the Limitations of General Systems Theory in Systems Engineering . . . . .	961
A. W. Jones	
The Limitations of Applied Systems Research . . . . .	971
M. McLean	
Appendix A . . . . .	981
Appendix B . . . . .	985
Author Index . . . . .	989
Subject Index . . . . .	995