

**Society for
General
Systems
Research**

An International
Organization For
The Development
of Theoretical
Systems

SYSTEMS SCIENCE AND SCIENCE

Proceedings of the
Twenty-Sixth Annual
Meeting of the
Society for General Systems Research
With the
American Association for the
Advancement of Science
Washington, D.C.
January 5-9, 1982

EDITOR:

LEN TRONCALE

TIB/UB Hannover 89
128 291 648



TABLE OF CONTENTS

Preface	i
Table of Contents - Overview	v
Table of Contents	vii
Introductionxiii

PART I: THE STUDY OF PHYSICAL AND NATURAL SYSTEMS

SECTION A. SYSTEMS METHODOLOGY IN THE PHYSICAL AND BIOLOGICAL SCIENCES	501
Davydov Solitons on Alpha-Helix Protein by Alwyn C. Scott	503
Methodological Aspects of Model Validation: A Model of the Human Renal-Artificial Kidney System by M.S. Leaning, R.J. Uttamsingh, E.R. Carson, C. Cobelli, and L. Finkelstein	508
Reproductive Microsystems with Material Self-Assembly and Second Law of Thermodynamics by Koichiro Matsuno	517
Methods of Simulating 3-D Tumor Growth and Treatment by Werner Düchting and Thomas Vogelsaenger	523
Information Theory Applied to the Study of Neural Codes by A.F. Rocha and J.W.M. Bassani	528
System Dynamics Modeling of Behavior and of Physiological Correlates of Behavior by W. Tom Bourbon, D. Mark Johns, and P. Steve Nussbaum	534
A General Survey of the Use of the Systems Approach in the Biological Sciences by Len Troncale	540
SECTION B. SYSTEMS METHODOLOGY IN ECOLOGY, RESOURCES, AND ENERGY MANAGEMENT	551
Uncertainty in Modeling the Environmental Fate of Mirex in Lake Ontario by Efraim Halfon	553
Structural Comparisons for Four Lake Ecosystem Models by Robert W. Bosserman	559
Operational Optimization in Energy Management Through Production Rescheduling by Robert Liang Koo and Eleri Cardoso	569
SECTION C. SYSTEMS METHODOLOGY IN ENGINEERING	
Stratified Dynamic Concepts for Modeling and Designing Complex Systems by Heinz G. Schwaertzel	577
Design of Service Delivery Systems by A. Wayne Wymore	585
A Theoretical Study on Configurations of Quality Control Systems by Osamu Furukawa, Hideomi Ikeshoji, and Hideya Ishizuchi	596
Deadbeat Tracking in Linear Multivariable Systems: A Polynomial-Matrix Approach by Bogumil Eichstaedt	602
Systems Engineering Methodology: A Conceptual Phase Decision Model by Melvin B. Kline	608
Some Considerations about "Hard" and "Soft" Methodologies by Carlos Alberto Ossa	618

PART II: THE STUDY OF SOCIAL SYSTEMS

SECTION A. SYSTEMS METHODOLOGY IN PSYCHIATRY AND PSYCHOLOGY.	621
Introduction to Invited Symposium on Systems Methodology in Psychology/ Psychiatry by William Gray.	623
Advances in Systems Methodology for Understanding the Human Knowledge Process as an Evolving Evolutionary General System in Psychology and Psychiatry by William Gray, Aristide H. Esser, and Lucille R. Gray.	625
Computer Simulation of Dyadic Personal Interactions: A Partial Model of Family Homeostasis by Karl E. Achenbach, Donald M. Keller, and Martin W. Denker	636
Complementarity, Autopoiesis, Synchronicity and Psychotherapy by James E. Durkin	642
Timekeeper-Spouses who Contribute to Equilibrium States in Alcoholic Family Systems by Mary Ann Walsh Eells.	643
SECTION B. SYSTEMS METHODOLOGY IN THE SOCIAL SCIENCES.	653
The Concept of Structure in the Theory of Social Systems by Takatoshi Imada	655
Normal and Dysfunctional Families: A Study of Quantitative Distinctions in Organization by Frederick Steier, M. Duncan Stanton, and Thomas C. Todd	663
Verifying Social Systems Theory in Practice: A Critique by Michael C. Jackson.	668
Developing a Cybernetic Model of Culture in History by Joan D. Lind.	674
"Asymmetry" Between Systems Methodology and Real-World Encounters: An Existential Approach to its Resolution in the Social Worker-Client Situation by Monte Hilliard Koppel	678
SECTION C. SYSTEMS METHODOLOGY AND EDUCATION	683
Perspectives on Education in Systems Methodology by Bela H. Banathy	685
Systems Concepts for Early Grades by Ruth-Ellen and J.P. Miller.	690
Technical Education as a Frame for Systems Thinking by István Kiss and Ervin Szücs	697
A Generalized Learner Controlled Education System by David L. Jelden and Bill R. Brown	707
The Design and Development of a Systems-Based Degree Course by F.R. Janes.	717
A Systems Research Based Curriculum for the Foundational Study of Education and Society by Scott William Erickson.	727
Steps Toward a Systems Approach in an Undergraduate Introduction to Literature Course in the Humanities by Michele Geslin Small.	734

SECTION C. SYSTEMS METHODOLOGY AND EDUCATION (CONTINUED)

A General Systems Approach to Redesigning the Education System by W. Jennings and B.K. Toren	740
Applying New Findings from the Neurosciences to Education by Ray Budde.	744
Mathematics on the Right Side of the Brain? by Preston C. Hammer	750
Measuring Staff Perceptions with an Output Analysis Instrument: Applications in Educational Institutions by Ernest M. Schuttenberg	759
Musimple: Computer-Based Learning of 7-Sign Music Notation System by Yael Bukspan	765
Developing General Systems Literacy: Steps Toward an Undergraduate Program in Systems Methodology by Howard Iver Thorsheim.	769
Guiding Educational Research Through Systems Research by Jesús Vázquez-Abad and P. David Mitchell	777

SECTION D. SOCIAL SYSTEMS ASPECTS OF TRANSPORTATION SYSTEMS

Social Systems Modeling as a Non Linear Process by Robert W. Crosby	785
Polinomics: A Complement to Economics? by Robert W. Crosby	786
Complex Behavior in a Von Thunen Model by Richard H. Day	787
Self-Organization, Dissipative Structures and Fluctuations by David Kahn	794
Applications of a Formal Systems Paradigm by Richard C. Brooks	798
Emergency Transportation: Analysis of the Air Component by Richard C. Brooks.	799
Issue Analysis Using a Formal Systems Paradigm by David W. Malone.	805
Strategic Planning for the Transportation of Energy by Philip R. Smith.	811

PART III: THE STUDY OF MAN-MADE SYSTEMS

SECTION A. PLANNING, DESIGN, AND MANAGEMENT OF HUMAN SYSTEMS.	817
Mergers in Retrenchment Settings by Roberta Snow	819
Complexity of Performing Ill-Defined Tasks by Manfred Kochen	823
Developing Socio-Political Capabilities in the Business Firm by Jacob de Smit.	829
Why Does Management Need Management Science? by Jonathan Rosenhead	834
Developing Norms for Organizational Effectiveness: The Case of U.S. Army Battalions by Gordon C. Ruscoe	840

SECTION B. SYSTEMS METHODOLOGY IN MANAGEMENT	847
Natural Laws in Management	
by Paul Rubinyi.	849
A Systems Improvement Method for Managers	
by Robert M. Krone	854
Developing Managerial Applications from Basic General Systems Concepts	
by Samir Chakraborty	861
General Cybernetic Systems Theory and the Systems Methodology of American	
Administration and Management	
by Abraham Stein	867
A General Policy Systems Approach to Organizational Governance	
by Carl Slawski.	875
Living Systems Theory as a Management Tool	
by Stephen L. Merker	886
Problems of Systems Literacy in Management Education	
by William H. Weekes	889
SECTION C. SYSTEMS METHODS IN URBAN AND RURAL PLANNING	895
Unknowns and Unknowables: Coping with Uncertainty in Socioecological Systems	
by Michael A. Goldberg	897
The Town as a System: A Methodology for Computerized Modelling of Building	
Process and Living	
by Tage Frändberg.	919
The Planning Process as an Adaptive System	
by Julieta Pinheiro Martinelli	925
Systems Approach in the Planning of Human Activity Systems: Some Case	
Studies in Brazil	
by Luiz R.F. de Costa.	931
Social and Natural Regulation Processes and House Design	
by David L. Hawk	934
SECTION D. SYSTEMS METHODOLOGY IN HEALTH CARE AND CLINICAL RESEARCH.	945
Boundary Exchange and Timekeeping in Health Care Management	
by Mary Ann Walsh Eells.	947
Functional Localization Assumptions as Impediments to Clinical Research	
by William Bechtel	953
SECTION E. SYSTEMS METHODS APPLIED TO GOVERNMENT AND CONFLICT RESOLUTION	963
Systems Methodology and Conflict Resolution	
by Melvin F. Shakun.	965
Formalizing Conflict Resolution in Policy Making	
by Melvin F. Shakun	966
Planning with the Virginia Division of Forestry	
by William C. Wood II, R.B. McDonald, and A.N. Christakis.	967
A Symposium: Systems Methodology Applied to Government	
by John N. Warfield.	976
Developments in Conflict Analysis	
by Niall M. Fraser and Keith W. Hipel.	978

SECTION E. SYSTEMS METHODS APPLIED TO GOVERNMENT AND CONFLICT RESOLUTION (CONTINUED)

Perceived Uncertainty and Organizational Control: A Pluralist Dialectical
Approach to the Modelling of Human Systems
by E.A. Lowe and J.C. Oliga 987

A Soft Systems Approach to Advanced Military Technology
by Margaret Blunden 995

AUTHORS AND AUTHORS-CITED INDEX