Contents

Preface ix
Acknowledgments xv

1 *System Principles* 1
1.1 A Behavioral Model of Rational Choice (1955) 7
1.2 Rational Choice and the Structure of the Environment (1956) 20
1.3 Motivational and Emotional Controls of Cognition (1967) 29

2 *Memory Structures* 39
2.1 Amounts of Fixation and Discovery in Maze Learning Behavior (1957) 44
2.2 How Big Is a Chunk? (1974) 50
2.3 The Information Storage System Called "Human Memory" (1976) 62
2.4 A Program Modeling Short-term Memory under Strategy Control (1976)
with Kevin J. Gilmartin and Allen Newell 84

3 *Learning Processes* 95
3.1 A Theory of the Serial Position Effect (1962)
with Edward A. Feigenbaum 102
3.2 Effects of Similarity, Familiarization, and Meaningfulness in Verbal Learning (1964)
with Edward A. Feigenbaum 114
3.3 One-trial and Incremental Learning (1967)
with Lee W. Gregg 124
3.4 A Note on Mathematical Models for Learning (1962) 133
3.5 A Note on Jost's Law and Exponential Forgetting (1966) 135

4 *Problem Solving* 137
4.1 The Processes of Creative Thinking (1962)
with Allen Newell and J. C. Shaw 144
4.2 Trial and Error Search in Solving Difficult Problems (1962)
with Peter A. Simon 175
4.3 A Chess Mating Combinations Program (1966)
with George W. Baylor 181
4.4 Cognitive Processes in Solving Algebra Word Problems (1966)
with Jeffery M. Paige 201

4.5 The Functional Equivalence of Problem Solving Skills (1975) 230
4.6 Modeling Strategy Shifts in a Problem Solving Task (1976)
with Stephen K. Reed 245

5 *Rule Induction and Concept Formation* 257
5.1 Human Acquisition of Concepts for Sequential Patterns (1963)
with Kenneth Kotovsky 263
5.2 Empirical Tests of a Theory of Human Acquisition of Concepts for Sequential Patterns (1973)
with Kenneth Kotovsky 274
5.3 Complexity and the Representation of Patterned Sequences of Symbols (1972) 292
5.4 Process Models and Stochastic Theories of Simple Concept Formation (1967)
with L. W. Gregg 307
5.5 Problem Solving and Rule Induction (1974)
with Glenn Lea 329

6 *Perception* 347
6.1 An Information Processing Explanation of Some Perceptual Phenomena (1967) 353
6.2 Information Processing Analysis of Perceptual Processes in Problem Solving (1969)
with Michael Barenfeld 363
6.3 A Simulation of Memory for Chess Positions (1973)
with Kevin J. Gilmartin 373
6.4 Perception in Chess (1973)
with William G. Chase 386
6.5 The Mind's Eye in Chess (1973)
with William G. Chase 404
6.6 Alternative Uses of Phonemic Information in Spelling (1973)
with Dorothea P. Simon 428

7 *Understanding* 445
7.1 Understanding Written Problem Instructions (1974)
with John R. Hayes 451
7.2 The Understanding Process: Problem Isomorphs (1976)
with John R. Hayes 477
7.3 Psychological Differences among Problem Isomorphs (1977)
with John R. Hayes 498

Index of Names 513
Index of Subjects 517