

CONTENTS

Acknowledgments		xi
<i>Conceptual Change Research: An Introduction</i>		1
STELLA VOSNIADOU		
Part I	THEORETICAL ISSUES IN CONCEPTUAL CHANGE RESEARCH	9
Chapter 1	Conceptual Change In Learning and Instruction: The Framework Theory Approach STELLA VOSNIADOU	11
Chapter 2	A Bird's-Eye View of the "Pieces" vs. "Coherence" Controversy (from the "Pieces" Side of the Fence) ANDREA A. DISESSA	31
Chapter 3	Two Kinds and Four Sub-Types of Misconceived Knowledge, Ways to Change It, and the Learning Outcomes MICHELENE T. H. CHI	49
Chapter 4	The Contextuality of Knowledge: An Intentional Approach to Meaning Making and Conceptual Change OLA HALLDÉN, MAX SCHEJA, AND LIZA HAGLUND	71
Chapter 5	Relations Between Short-term and Long-term Conceptual Change ROBERT S. SIEGLER AND MATIJA SVETINA	96

Part II	CONCEPTUAL CHANGE IN THE CONTENT AREAS	11
Chapter 6	Conceptual Change in Physics DAVID E. BROWN AND DAVID HAMMER	12
Chapter 7	Conceptual Change When Learning Experimental Design STEPHANIE SILER, DAVID KLAHR, AND BRYAN J. MATLEN	13
Chapter 8	Learning and Teaching about Matter in the Elementary Grades: What Conceptual Changes Are Needed? CAROL L. SMITH AND MARIANNE WISER	15
Chapter 9	Learning and Teaching About Matter in the Middle-School Years: How Can the Atomic-Molecular Theory Be Meaningfully Introduced? MARIANNE WISER AND CAROL L. SMITH	17
Chapter 10	Conceptual Change in Naïve Biology KAYOKO INAGAKI AND GIYOO HATANO	19
Chapter 11	Evolutionary Biology and Conceptual Change: A Developmental Perspective E. MARGARET EVANS	22
Chapter 12	Conceptual Understanding in the Domain of Health DAVID R. KAUFMAN, ALLA KESELMAN, AND VIMLA L. PATEL	24
Chapter 13	Changing Historical Conceptions of History GAEA LEINHARDT AND ANITA RAVI	25
Chapter 14	Conceptual Change and Historical Narratives About the Nation: A Theoretical and Empirical Approach MARIO CARRETERO, JOSE A. CASTORINA, AND LEONARDO LEVINAS	26
Chapter 15	Conceptual Change in the Social Sciences CECILIA LUNDHOLM AND PETER DAVIES	28
Chapter 16	The Framework Theory Approach Applied to Mathematics Learning XENIA VAMVAKOUSHI, STELLA VOSNIADOV, AND WIM VAN DOOREN	30

Chapter 17	The Bundling Hypothesis: How Perception and Culture Give Rise to Abstract Mathematical Concepts in Individuals	322
	KRISTEN P. BLAIR, JESSICA M. TSANG, AND DANIEL L. SCHWARTZ	
Part III	CONCEPTUAL CHANGE IN THE PHILOSOPHY AND HISTORY OF SCIENCE	341
Chapter 18	The Problem of Conceptual Change in the Philosophy and History of Science	343
	THEODORE ARABATZIS AND VASSO KINDI	
Chapter 19	Conceptual Change in the History of Science: Life, Mind, and Disease	360
	PAUL THAGARD	
Part IV	LEARNER CHARACTERISTICS AND MECHANISMS FOR CONCEPTUAL CHANGE	375
Chapter 20	Beyond Knowledge: Learner Characteristics Influencing Conceptual Change	377
	GALE M. SINATRA AND LUCIA MASON	
Chapter 21	Mental Modeling in Conceptual Change	395
	NANCY J. NERSESSIAN	
Chapter 22	Roles for Explanatory Models and Analogies in Conceptual Change	412
	JOHN J. CLEMENT	
Chapter 23	Conceptual Innovation and Transfer	447
	LEE MARTIN AND DANIEL L. SCHWARTZ	
Chapter 24	Conceptual Change Through Collaboration	466
	NAOMI MIYAKE	
Part V	INSTRUCTIONAL APPROACHES TO PROMOTE CONCEPTUAL CHANGE	485
Chapter 25	Teaching Science for Conceptual Change: Theory and Practice	487
	REINDERS DUIT, DAVID F. TREAGUST, AND ARI WIDODO	

- Chapter 26 Self-Organization in Conceptual Growth: Practical Implications
CARL BEREITER AND MARLENE SCARDAMALIA
- Chapter 27 The Knowledge Integration Perspective: Connections Across
Research and Education
DOUGLAS B. CLARK AND MARCIA C. LINN
- Chapter 28 Promoting Conceptual Change Through Inquiry
CLARK A. CHINN, RAVIT GOLAN DUNCAN, MICHAEL DIANOVSKY,
AND RONALD RINEHART
- Chapter 29 Representation Construction to Support Conceptual Change
RUSSELL TYTLER AND VAUGHAN PRAIN
- Chapter 30 Model Building for Conceptual Change
DAVID JONASSEN AND MATTHEW A. EASTER
- Part VI REFLECTIONS
- Chapter 31 Situating Text, Talk, and Transfer in Conceptual Change:
Concluding Thoughts
P. KAREN MURPHY AND PATRICIA A. ALEXANDER

Contributors

Index