

## Contents

<i>List of Figures</i>	page xii
<i>List of Boxes</i>	xiv
<i>Preface</i>	xvii
<i>Acknowledgments</i>	xix
<b>1 What Is Creativity?</b>	<b>1</b>
1.1 Recognizing Creativity	1
1.1.1 Scientific Domains	1
1.1.2 Artistic Domains	4
1.2 Defining Creativity	7
1.2.1 Comprehensiveness in Defining Creativity	9
1.2.2 Critical Factors to Keep in Mind When Defining Creativity	11
1.3 Understanding “Appropriateness” Appropriately	12
1.4 Challenges in Recognizing or Evaluating Creativity	15
1.4.1 How Do We “Recognize” Creativity?	15
1.4.2 To What Extent Can We Agree about Creativity?	17
1.4.3 Consciousness and Creativity	19
1.5 The Purpose of Creativity	20
1.5.1 A Road Map for Using this Book	21
<b>2 How Can Creativity Be Assessed?</b>	<b>24</b>
2.1 Approaches to Investigating Creativity	24
2.1.1 Person	25
2.1.2 Product	28
2.1.3 Press/Place	31
2.1.4 Process	34
2.1.5 Issues for Further Consideration	38
2.2 Assessing Creativity: Person Measures	39
2.2.1 Divergent Thinking Test Batteries	39
2.2.2 Self-Report Measures	40
2.3 Assessing Creativity: Process Measures	41
2.3.1 Convergent Thinking Tasks	42
2.3.2 Process-General Divergent Thinking Tasks	44
2.3.3 Process-Specific Divergent Thinking Tasks	46
2.4 Assessing Creativity: Product Approach	47
2.5 Issues for Further Consideration	47

viii	Contents
<b>3 Cognitive Explanations of Creativity</b>	<b>51</b>
3.1 Explanations of Creativity	51
3.2 Focus on Individual Differences	53
3.2.1 Knowledge Storage: Associative Hierarchies	53
3.2.2 Knowledge Access or Retrieval: Defocused Attention	55
3.2.3 Attentional States: Disinhibition	58
3.2.4 Summary: Individual Differences-Based Cognitive Explanations	60
3.3 Focus on Intra-Individual Dynamics	61
3.3.1 Stages of the Creative Process: Wallas Model	61
3.3.2 Stages of the Creative Process: Genevieve Model	65
3.3.3 Summary: Intra-Individual-Based Cognitive Explanations	66
3.4 Creative Cognition: Relevant Operations	67
3.4.1 Insight	67
3.4.2 Analogy	68
3.4.3 Metaphor	69
3.4.4 Imagery	70
3.4.5 Conceptual Expansion	71
3.4.6 Overcoming Knowledge Constraints	72
3.4.7 Flow	73
3.5 Issues for Further Consideration	74
<b>4 Brain-Based Global Explanations of Creativity</b>	<b>78</b>
4.1 The Physiological Approach to Creativity	78
4.2 Dual-Factor Models	81
4.2.1 Right Brain over Left Brain	81
4.2.2 Reduced Concept-Driven Thought or Top-Down Control	85
4.2.3 Brain Networks Perspective	89
4.2.4 What Speaks against Dual-Factor Global Explanations?	93
4.3 Multiple-Factor Models	94
4.3.1 An Evolutionary Brain Networks Perspective	95
4.3.2 An Evolutionary Predictive Perspective	97
4.3.3 What Speaks against Multiple-Factor Models?	100
4.4 A Final Word	101
<b>5 Brain-Based Local Explanations of Creativity</b>	<b>103</b>
5.1 The Local Approach to Creativity	103
5.2 Brain-to-Process Explanations	106
5.2.1 Frontal Lobe Function/Dysfunction	107
5.2.2 Basal versus Transient Hypofrontality	110

<b>Contents</b>	<b>ix</b>
5.2.3 Alpha Wave-Related Brain Activity	112
5.2.4 Other Specific Brain Regions of Interest	114
5.3 Process-to-Brain Explanations	115
5.3.1 Insight	117
5.3.2 Analogical Reasoning	118
5.3.3 Metaphor	119
5.3.4 Conceptual Expansion	120
5.3.5 Overcoming Knowledge Constraints	121
5.3.6 Imagery	122
5.4 Critical Evaluation of Local Explanations	123
<b>6 Neuroscientific Methods in the Study of Creativity</b>	<b>126</b>
6.1 Mapping the Brain: Gross Anatomy, Electrical Activity, and Blood Flow	126
6.2 Functional Neuroimaging Methods	130
6.2.1 rCBF via Radioactive Tracer Techniques	131
6.2.2 fMRI	135
6.2.3 fMRI Connectivity	137
6.3 Structural Neuroimaging Methods	139
6.3.1 Surface-Based and Voxel-Based Approaches	140
6.3.2 Diffusion Tensor Imaging (DTI)	141
6.4 Electroencephalogram (EEG) Methods	144
6.4.1 Power	145
6.4.2 Evoked Potentials	148
6.5 Neuromodulation Methods	149
6.5.1 Neuromodulation and Creative Cognition	150
6.6 Issues for Further Consideration	152
<b>7 Unique Problems in the Neuroscientific Study of Creativity</b>	<b>155</b>
7.1 Problems? What Problems?	155
7.2 The Problem of Trials	158
7.2.1 Number of Trials	159
7.2.2 Duration of Trials	160
7.3 The Problem of Responses	161
7.3.1 Non-Binary and Subjective Responses	161
7.3.2 Response-Induced Movement	162
7.3.3 Post-Neuroimaging Response Entry	163
7.4 The Problem of Tasks	163
7.4.1 Creativity Task Variability	164
7.4.2 Less-Demanding Control Tasks	164
7.5 The Problem of Groups	165

x	Contents
7.6	The Problem of Validity 167
7.7	How to Deal with Problems? 169
<b>8</b>	<b>Musical Creativity 173</b>
8.1	Music and Musicality 173
8.2	Music Perception 176
8.2.1	Rhythm, Pitch, and Affect 176
8.2.2	Post-Training Effects 177
8.3	Music Performance 180
8.3.1	Behavioral Characteristics 181
8.3.2	Brain Basis 182
8.4	Music Composition 184
8.4.1	Behavioral Studies 186
8.4.2	Neuroscientific Studies 188
8.5	Musical Improvisation 189
8.5.1	Behavioral Characteristics 190
8.5.2	Brain Correlates 192
8.6	Music and Brain Plasticity 195
<b>9</b>	<b>Literary Creativity 200</b>
9.1	Creativity in Language and Literature 200
9.2	Literary Creativity: Factors, Processes, and Stages 202
9.2.1	Person-Based/Individual Factors 203
9.2.2	Process and Constraints 205
9.2.3	Stages/Components of Creative Writing 206
9.3	Language and the Brain 208
9.4	Literary Creativity and the Brain 212
9.4.1	Verbal Divergent Thinking Tasks 214
9.4.2	Metaphor and Other Forms of Semantic Leaps 216
9.4.3	Story Generation 218
9.4.4	Prose 218
9.4.5	Poetry and Lyrics 221
9.5	Issues for Further Consideration 222
<b>10</b>	<b>Visual Artistic Creativity 226</b>
10.1	Visual Art and the Plastic Brain 226
10.2	Information Processing in Visual Artistic Creativity 227
10.2.1	Visuospatial Ability 229
10.2.2	Drawing and Hand–Eye Coordination 231
10.2.3	Imagery 233
10.2.4	Synesthesia 235

<b>Contents</b>	<b>xi</b>
10.3 Visual Artistic Creativity and the Healthy Brain	236
10.3.1 Visual Divergent Thinking	237
10.3.2 Creative Imagery and Drawing	238
10.3.3 Artistic Expertise and Training	241
10.4 Visual Artistic Creativity and the Disordered Brain	242
10.4.1 Brain Injury in Artists	243
10.4.2 Dyslexia	244
10.4.3 De Novo Artistic Proficiency	245
10.5 Issues for Further Consideration	246
<b>11 Kinesthetic Creativity</b>	<b>250</b>
11.1 Creativity in Body Movement: Is This a Real Thing?	250
11.2 Concepts Relevant to Psychology and Neuroscience	253
11.2.1 Common Coding, Mirror Neurons, and Embodied Cognition	253
11.2.2 Joint Improvisation	254
11.2.3 Flow: The Cornerstone of Kinesthetic Creativity?	255
11.3 Dance	257
11.3.1 Information Processing in Dance	259
11.3.2 Neural Processing in Dance	260
11.3.3 Creativity in Dance: What about Theoretical Viewpoints?	265
11.4 Sports	268
11.4.1 Neural and Information Processing in Sports	269
11.4.2 Creativity in Sports	272
<b>12 Scientific Creativity</b>	<b>276</b>
12.1 Scientific Creativity is Understudied	276
12.2 Mental Operations Relevant to Scientific Creativity	279
12.2.1 Deductive, Inductive, and Abductive Reasoning	279
12.2.2 Analogical and Relational Reasoning	283
12.2.3 Problem Solving and Insight	286
12.2.4 Breadth of Knowledge	289
12.3 Theoretical Views of Scientific Creativity	290
12.4 Issues for Further Consideration	292
<b>Afterword – From Cave Art to Latte Art</b>	<b>295</b>
<i>References</i>	297
<i>Index</i>	365

*The color plate section can be found between pp. 204 and 205.*