

Contents

Acknowledgments	xi
Contributors	xiii
Prologue	xvii
Michael F. Bunting and Jared M. Novick	

I. COGNITIVE PERSPECTIVE

1. Cognitive Perspectives of Working Memory Training: Current Challenges in Working Memory Training	3
<i>Kenny Hicks and Randall W. Engle</i>	
Introduction	3
Investigating Transfer	5
Criticisms of Working Memory Training	6
Four Directed Questions	8
Conclusion	11
2. Working Memory Training From an Individual Differences Perspective: Efficacy in Older Adults	14
<i>Erika Borella, Barbara Carretti, Cesare Cornoldi, and Rossana De Beni</i>	
Introduction	14
Question 1: Theory of Working Memory Training	15
Question 2: Major Claims of Working Memory Training	19
Question 3: Methodological Issues	28
Question 4: Contributions to the Field	33
3. Training Working Memory for 100 Days: The COGITO Study	40
<i>Florian Schmiedek, Martin Lövdén, and Ulman Lindenberger</i>	
Question 1: Theory of Working Memory Training	40
Question 2: Major Claims of Working Memory Training	43
Question 3: Methodological Issues	46
Question 4: Contributions to the Field	50
4. How Strong Is the Evidence for the Effectiveness of Working Memory Training?	58
<i>Claudia C. von Bastian, Sabrina Guye, and Carla De Simoni</i>	
Introduction	58
Question 1: Theory of Working Memory Training	58
Question 2: Major Claims of Working Memory Training	60

Question 3: Methodological Issues	61
Question 4: Contributions to the Field	70
Conclusion	71

II. NEUROCOGNITIVE PERSPECTIVE

5. Neuroscience Perspectives on Cognitive Training	79
<i>Stefanie E. Kuchinsky and Henk J. Haarmann</i>	
Introduction	79
Does Training Effectively Target Desired Cognitive Systems?	81
Do the Benefits of Cognitive Training Transfer?	84
Do the Benefits of Cognitive Training Persist?	86
For Whom Is Cognitive Training Most Effective?	88
Can Behavioral Training Be Augmented With Brain Regulation and Stimulation?	91
What Neuroscience Approaches on the Horizon Might Change the Cognitive Training Game?	93
Conclusion	96
6. Working Memory Training and Transcranial Direct Current Stimulation	105
<i>Jacky Au, Martin Buschkuehl, and Susanne M. Jaeggi</i>	
Introduction	105
What Is Transcranial Direct Current Stimulation?	106
Cognitive Effects of Transcranial Direct Current Stimulation	107
Pairing WM Training With Transcranial Direct Current Stimulation	109
How Does Transcranial Direct Current Stimulation Inform Cognitive Training Research?	116
Final Remarks	120
Funding and Conflicts of Interest	121
7. Cognitive Training: Component Processes and Criteria for Change	131
<i>Kristine B. Walhovd, Anders M. Fjell, and Lars Nyberg</i>	
Introduction	131
Will the Real Component Process Please Stand Up?	131
What Does a Training Effect Really Mean?	133
Conclusions and Future Directions	136

III. DEVELOPMENTAL PERSPECTIVE

8. Review of the Evidence on, and Fundamental Questions About, Efforts to Improve Executive Functions, Including Working Memory	143
<i>Adele Diamond and Daphne S. Ling</i>	
Introduction	145

Executive Functions (EFs)	153
Why It Is Important to Improve EFs	157
Principles of Experimental Design and Principles for Interpreting Results Often Violated in Training or Intervention Studies	161
Studies Included in the Systematic Review	166
Principles That Govern EF Training, Whatever the Form	168
How Different Approaches to Improving EFs Measure Up	186
Across ALL Approaches to Improving EFs, Which Are the <i>Most</i> Promising Thus Far?	357
Across ALL Approaches, Which Have Been Least Successful Thus Far in Improving EFs?	363
Limitations of the Present Systematic Review and a Call to Others to Analyze the Extant Literature in Ways Other Than We Have	365
A Call to Researchers to Consider Additional Analyses of Their Data	369
A Call to Researchers to Study Factors Affecting How Long Benefits Last	371
What About Training People in Strategies to Minimize the Need for EFs, so That People Do Not Have to Expend So Much Effort Trying to Exercise EFs?	374
What About Looking at the EF Benefits of Being Outside in Nature?	374
Our Predictions About How to Most Effectively Improve EFs	375
Final Thoughts	385
9. Fundamental Questions Surrounding Efforts to Improve Cognitive Function Through Video Game Training <i>Adam Eichenbaum, Daphne Bavelier, and C. Shawn Green</i>	432
The Curse of Learning Specificity	432
Video Game Experience Affecting Cognitive Function	433
Methodological Issues	437
Theoretical Issues	445
Conclusions	447
10. Logical and Methodological Considerations in Cognitive Training Research <i>Benjamin Katz and Priti Shah</i>	455
Introduction	455
Working Memory and Executive Functions	455
Rethinking Transfer	460
Evidence of Transfer After Training	466
Historical Examples and Instrumental Enrichment	469
Moderating Factors of Cognitive Training	471
Conclusion	475
11. Music Training: Contributions to Executive Function <i>Brooke M. Okada and L. Robert Slevc</i>	487
Introduction	487

Music Training and Cognitive Flexibility	490
Music Training and Inhibitory Control	490
Music Training and Working Memory Updating	491
Randomized Controlled Trials: Music Training and EF	492
Conclusion	501
12. The Effectiveness of Training in Task Switching: New Insights and Open Issues From a Life-Span View	508
<i>Jutta Kray and Sandra Dörrenbächer</i>	
Life-Span Changes in Task Switching	508
Flexibility and Plasticity of Task-Switching Performance Across the Life Span	510
Age Differences in the Effectiveness of Task-Switching Training	
Interventions: Training, Transfer, and Maintenance Effects	514
The Role of Interindividual Differences on Training and Transfer of Task Switching	523
Summary and Conclusions	527
Open Issues for Designing Cognitive Intervention Across the Life Span	528
Epilogue: Don't Buy the Snake Oil	539
<i>Michael R. Dougherty and Randall W. Engle</i>	
Are the Effects of WM Training Dependent on the Type of Control Condition Used in the Study Design?	540
Does Random Assignment to Condition Matter?	540
Are Training Effects Dependent on the Overlap Between Training and Transfer Task Operations or Stimuli?	541
What Might a Convincing Study Look Like?	541
But What About the Brain?	542
Summary	542
<i>Index</i>	545