# Contents

Preface xi

*W. Alex Edmonds and Gershon Tenenbaum*

About the Editors and Contributing Authors xvii

## Part I General Biofeedback and Neurofeedback Forwards 1

1. The Use of General Biofeedback in the Pursuit of Optimal Performance 3
   *Donald Moss and “Sue” Vietta Wilson*

   - Introduction 3
   - Paradigms in Biofeedback Assisted Optimal Performance Work 4
   - The Field of Optimal Performance Psychophysiology 6
   - A Brief History 7
   - Biofeedback Tools for Optimal Performance: Modalities 7
   - Standards for Application 10
   - Professional Resources 10
   - Conclusion 12
   - References 12

2. Performance Enhancement Applications of Neurofeedback 17
   *Siegfried Othmer and Susan F. Othmer*

   - Introduction 17
   - Application to Optimal Functioning 19
   - The Role of Assessment 22
   - The Reduction to Practice 24
   - Professional Preparation 26
   - Principal Neurofeedback Approaches 26
   - Summary and Conclusion 28
   - Resources 29
   - References 29
Part II Case Presentations

3 Case 1 – Bad Shot, Good Shot: Neurofeedback for World Champion or Developing Athlete
   “Sue” Vietta E. Wilson and Lindsay Shaw
   World Champion Archer: Kevin Evans 33
   Using EEG for a Developing Athlete 38
   Long-term EEG Training for Developing Athletes 44
   Summary of Bad Shot, Good Shot 45
   References 45

4 Case 2 – Imagery Assessment and Training with QEEG: What You See Is Not All There Is
   “Sue” Vietta E. Wilson and Lindsay Shaw
   Introduction 47
   Imagery Definition and Models 47
   Models of Imagery 48
   Assessment of Imagery 49
   EEG and Imagery 51
   The Future of Imagery Assessment 53
   Methodological Issues in Imagery 54
   Clinical Suggestions 55
   Clinical Use of QEEG for the Assessment and Training of Sport Imagery 56
   Typical Training Session including Imagery 59
   Summary 66
   References 67

5 Case 3 – Simultaneous Alpha EEG Enhancing and Frontal’s Muscle EMG Decreasing: Biofeedback Training for Musical Peak Performance
   Olga M. Bazanova
   Introduction 71
   Background Information of Client 71
   Description of the Presenting Problem 74
   Assessment and Diagnosis 74
   Alpha Activity EEG Analysis 76
   Intervention 78
   Outcomes and Discussion of Findings 89
   References 90

6 Case 4 – The Golfer Who Couldn’t Pass the Anxiety Test!
   D. Jane Arave
   Background Information of Client 94
   On Being a “Mental Coach” 95
   Description of the Presenting Problem 95
   Biofeedback and Neurofeedback Protocol – Assessment, Diagnosis, and Training 96
Outcome and Discussion 105
References 108

7 Case 5 – Biofeedback for Relaxation 110
Ronald Rosenthal

Introduction 110
Background Information 111
Assessment and Diagnosis 112
Interventions and Results 113
Summary and Conclusions 119
Reference 119

8 Case 6 – The Road to Olympic Medal 120
Boris Blumenstein and Iris Orbach

Background Information 120
Athlete 121
Intervention, Equipment, and Measurements 123
Results and Discussion of Findings 130
References 132

9 Case 7 – Biofeedback Training at Sea 134
Boris Blumenstein and Iris Orbach

Background Information 134
Athlete 135
Equipment, Assessment and Diagnosis 135
Intervention and Settings 137
References 143

10 Case 8 – I Thought I Was Relaxed: The Use of SEMG Biofeedback for Training Awareness and Control 144
Richard Harvey and Erik Peper

Introduction 144
Lack of Muscle Tension Awareness 145
Clinically Relevant Findings 147
Dysponesis 147
Making the Invisible Visible 149
Example 1: Improving Health at the Computer 149
Assessment 150
Discussion of the Assessment 151
Training 151
Example 2: Enhancing Performance Working out in the Gym on an Elliptical Machine 152
Discovery of Dysponesis 153
Biofeedback Training to Correct Equipment-related Dysponesis 153
Performance Benefits of Reducing Shoulder and Arm Dysponesis 155
Discussion 157
References 158
11 Case 9 – Psychophysiological Assessment and Biofeedback during
Official Baseball Games: Procedures, Methodologies, Findings and
Critical Issues in Applied Sport Psychology
Roland A. Carlstedt

Introduction
A Hierarchical Evidence-based Step-by-Step Ecological Protocol
Primary Higher Order Factors and Their Relevance to Biofeedback
Construct Validity of the Carlstedt Protocol Athlete’s Profile and Critical
Moments Model of Peak Performance
Applying the CP to Elite Youth Team Baseball Players: Assessment,
Intervention and Findings
In-the-Laboratory Psychophysiological Stress Testing
Starting Player Stress Test Responses
Procedures during Official Games: Pre-intervention Phase
Procedures During Official Games: Intervention Phase
The Intervention: “Lock-In”-HRD/HRV Biofeedback Protocol
The “Lock-In” – HRD Biofeedback: Step-by-Step
Critical Moment Analyses
Findings
Case Studies: Relationships between Heart Rate Variability Components
and Batting Performance and Pre-Intervention vs. Intervention
Batting Performance
Pre-Intervention HRV
Select Case Studies
Summary: Critical Issues in Sport Psychophysiology and Biofeedback
Conclusions
Overview
References

12 Case 10 – Performance Anxiety, Biofeedback and the Pianist:
Wind Instrument Players are not the only Musicians Affected
by Breathing
Tom D. Kennedy and W. Alex Edmonds

Introduction
Background Information of Client
Description of the Presenting Problem
Assessment and Diagnosis
Intervention
Outcomes and Discussion of Findings
References

13 Case 11 – The 400-meter Sprinter Who Ran Too Fast!
W. Alex Edmonds

Background Information of Client
Description of the Presenting Problem
Contents

Assessment and Diagnosis 220
Intervention 222
Outcomes and Discussion of Findings 227
References 230

Diane Roberts Stoler

The Brain 232
Brain Injury 232
Types of Biofeedback and Neurofeedback 233
Additional Modalities 235
Two Case Studies 236
Case 2: Presenting Problem 240
Discussion of Findings 244
Conclusion 245
Further Reading 245

Part III Certification, Equipment, and Future Directions 247

15 Certification and Ethics in Applied Psychophysiology (90876) 249
Phillip A. Hughes and Fred Shaffer

BCIA’s Mission 249
What Certification Means 250
Recognition of BCIA Board Certification 250
BCIA Biofeedback Areas 250
BCIA Certification Programs 250
Levels of Experience 251
Who Are BCIA Certificants? 252
What Is the Value of BCIA Certification? 252
How Can You Become BCIA Board Certified? 252
BCIA’s Professional Standards and Ethical Principles 252
Case 1: Coding of Biofeedback Therapy for Insurance Reimbursement 253
Case 2: Touching 254
Case 3: Scope of Practice 255
References 255

16 Psychophysiology: Equipment in Research and Practice 257
Derek T.Y. Mann and Chris M. Janelle

Introduction 257
Biofeedback and Performance 258
Neurofeedback and Performance 261
Biofeedback and Neurofeedback Modalities 262
Psychophysiological Recording Devices 267
References 270
17 Future Directions in Applied Psychophysiology: Skills Not Pills  
*Richard Harvey and Erik Peper*

Overview  
275

Treating Illnesses that are Caused or Aggravated by Stress, Depression, Anxiety, and Unhealthy Life Patterns  
277

Holistic Whole-Person Views in Applied Psychophysiology  
278

Technological Advances and Applied Psychophysiology  
283

Conceptual Modeling  
284

References  
286

Index  
293