Contents

Part I Introduction

1 Introduction .................................................. 3
  1 Sternberg’s Call for Advances in Technology for Assessment of Intelligence ......................... 4
  2 Dodrill’s Call for Advances in Technology for Neuropsychological Assessment .................. 4
  3 From Lesion Localization to Assessment of Everyday Functioning ........................................... 5
  4 Bilder’s Neuropsychology 3.0: Evidence-Based Science and Practice ..................................... 6
  5 Computerized Neuropsychological Assessment Devices .......................................................... 6
  6 Ecological Validity and Assessment of Everyday Functioning ................................................. 7
  7 Construct-Driven Versus Function-Led Approaches ................................................................. 7
  8 Affective Neuroscience and Clinical Neuropsychology ........................................................... 8
  9 Virtual Environments for Enhanced Neuropsychological Assessments ....................................... 9
  10 Plan for This Book ........................................... 9

2 Ecological Validity ............................................. 11
  1 Introduction .................................................. 11
  2 The Everyday/Laboratory Research Conflict ................................................................. 13
  3 Early Attempts at a Neuropsychology-Specific Definition of Ecological Validity ....................... 14
  4 Construct-Driven and Function-Led Approaches to Neuropsychological Assessment ........... 17
     4.1 Function-Led Tests that Are Representative of Real-World Functions ............................... 18
     4.2 Real-World Assessments Using the Multiple Errands Tasks: Potential and Limitations .......... 19

xiii
5 Veridical and Actor-Centered Decision Making 20
6 Importance of Affective States for Cognitive Processing 21
7 Conclusions 26

Part II Evolution of Neuropsychological Assessment

3 Neuropsychological Assessment 1.0 31
1 Historical Development of Neuropsychological Assessment 1.0 31
2 Neuropsychology’s Prehistory 32
   2.1 Diagram-Makers and Nineteenth-Century Medicine 33
3 Neuropsychological Assessment and Localization 34
   3.1 Kurt Goldstein: A Holistic Approach to Neuropsychology 34
   3.2 Lev Vygotsky and Alexander Luria: Russian Neuropsychology 36
   3.3 Physiological and Comparative Psychology (Twentieth Century) 37
   3.4 Summary 39
4 Development of the Quantitative Test Battery 40
   4.1 Alfred Binet and Psychometric Assessment of Intellectual Ability 40
   4.2 David Weschler: World Wars and Weschler Scales 40
5 Ward Halstead: Establishment of the Fixed Battery Neuropsychological Battery 42
6 Contemporary Development of the Flexible Test Battery 43
   6.1 Arthur Benton: Iowa-Benton Flexible Battery Approach 43
   6.2 Edith Kaplan: Boston Process Approach 44
7 Conclusions 44
8 Changing Roles and Tools in Neuropsychological Assessment 1.0 46

4 Neuropsychological Assessment 2.0: Computer-Automated Assessments 47
1 Historical Development of Computerized Assessments 50
   1.1 Early Attempts at Automation 50
   1.2 Computer Automations of Paper-and-Pencil Tests 51
   1.3 Computer Scoring of Paper-and-Pencil Tests 52
2 Application Areas of Computerized Assessments 53
   2.1 Computer-Automated Batteries for Return-to-Capacity Decisions 53
   2.2 Computer-Automated Neuropsychological Assessment with Specific Patient Populations 55
3 Common Currency” Assessment Batteries .......................... 59
  3.1 Penn Computerized Neurocognitive Battery ................. 59
  3.2 NIH Toolbox .................................................................. 60
  3.3 NIH Executive Abilities: Methods and Instruments
     for Neurobehavioral Evaluation and Research
     (EXAMINER) ................................................................ 61
4 What About Ecologically Valid Computer-Based
     Assessments? .................................................................. 61
5 Neuropsychological Assessment 3.0 ................................. 65
  1 What Constitutes an Ecologically Valid Assessment
     of Cognitive Functioning ................................................. 66
    1.1 Construct-Driven Versus Function-Led Assessments ....... 66
    1.2 Importance of Affective States for Cognitive Processing... 68
  2 Construct-Driven Virtual Environments ............................ 69
    2.1 Virtual Reality Versions of the Wisconsin Card
        Sorting Test ................................................................. 69
    2.2 Virtual Classroom for Assessment of Attention ............ 70
    2.3 Virtual Apartment for Assessment of Attention ............ 74
    2.4 Construct-Driven Driving Simulations ......................... 74
  3 Need for Function-Led Assessments ................................. 75
    3.1 Multiple Errands Paradigm for Function-Led
        Assessments ............................................................... 76
    3.2 Driving Simulator Paradigm for Function-Led
        Assessments ............................................................... 83
  4 Virtual Environments for Assessment of Memory .............. 86
    4.1 Virtual Environments for Episodic Memory
        in Complex Conditions ................................................ 87
    4.2 Active Versus Passive Navigation ................................ 88
    4.3 Prospective Memory .................................................... 89
  5 Enhanced Ecological Validity via Virtual Environments
     for Affective Assessments .............................................. 91
    5.1 Virtual Environments for Studies of Fear Conditioning ..... 91
    5.2 Virtual Environments to Elicit Affective Responses
        in Threatening Contexts ............................................. 92
  6 Conclusions .................................................................. 95

Part III Next Generation Neuropsychological Applications

6 Telemedicine, Mobile, and Internet-Based Neurocognitive
   Assessment ................................................................. 99
  1 Video Teleconferencing for Teleneuropsychological
     Assessment ................................................................. 100
    1.1 Mini Mental State Examination via Remote
        Administration .......................................................... 101
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2 Neuropsychological Batteries via Video Teleconferencing</td>
<td>102</td>
</tr>
<tr>
<td>1.3 Gerontology Applications of Videoconference-Based Assessment</td>
<td>103</td>
</tr>
<tr>
<td>1.4 Language Assessments</td>
<td>104</td>
</tr>
<tr>
<td>1.5 Acceptability of Neuropsychological Screening Delivered via Telehealth</td>
<td>104</td>
</tr>
<tr>
<td>2 Smartphones for Telephone-Based Neuropsychological Assessment</td>
<td>105</td>
</tr>
<tr>
<td>3 Ecological Momentary Assessments</td>
<td>106</td>
</tr>
<tr>
<td>4 Web-Based Computerized Assessments</td>
<td>107</td>
</tr>
<tr>
<td>5 Summary and Conclusions</td>
<td>110</td>
</tr>
<tr>
<td>7 Neuropsychological Rehabilitation 3.0: State of the Science</td>
<td>113</td>
</tr>
<tr>
<td>8 Future Prospects for a Computational Neuropsychology</td>
<td>135</td>
</tr>
</tbody>
</table>

Part IV Conclusions

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Formal Definitions of Neuropsychological Concepts and Tasks in Cognitive Ontologies</td>
<td>136</td>
</tr>
<tr>
<td>1.1 Covariance Among Neuropsychology Measures of Differing Domains</td>
<td>136</td>
</tr>
<tr>
<td>1.2 Lack of Back-Compatibility in Traditional Print Publishing</td>
<td>136</td>
</tr>
<tr>
<td>1.3 Neuropsychology’s Need for Cognitive Ontologies</td>
<td>137</td>
</tr>
<tr>
<td>2 Web 2.0 and Collaborative Neuropsychological Knowledgebases</td>
<td>138</td>
</tr>
<tr>
<td>3 Construct-Driven and Function-Led Redux</td>
<td>140</td>
</tr>
<tr>
<td>3.1 Virtual Environments for Assessing Polymorphisms</td>
<td>141</td>
</tr>
<tr>
<td>3.2 Neuropsychological Assessment Using the Internet and Metaverse Platforms</td>
<td>142</td>
</tr>
</tbody>
</table>
4 Computational Neuropsychology ............................. 143
  4.1 Virtual Environments as a Special Case of Computerized Neuropsychological Assessment Devices .............. 143
  4.2 Extending Computer-Automated Construct-Driven Ontologies to Virtual Environments ......................... 144
  4.3 Construct-Driven and Function-Led Virtual Environments for Hot and Cold Processing ......................... 145

References ..................................................... 147

Index ............................................................. 185
Clinical Neuropsychology and Technology
What's New and How We Can Use It
Parsons, Th.D.
2016, XIX, 190 p., Hardcover
ISBN: 978-3-319-31073-2