

Preface

Perhaps it is because the profession of clinical neuropsychology is so young that any progress made in it may seem to be significant. However, it appears to the President of this Division that we are not actually making as much progress as we are inclined to believe and that this is true both in absolute terms and in comparison with the progress made in other clinical neurosciences.

Dodrill (1997, p. 1)

As is apparent in Dodrill's presidential address to the American Psychological Association's division on neuropsychology, I am not the first to stress the importance of technological progress for advancing neuropsychological assessments. What is striking about Dodrill's comments is that they are as true today as they were two decades ago. Advances in neuropsychological assessment are far behind progress made in other clinical neurosciences. The developments in neuroscience, computer science, and information technology have all the hallmarks of a broad technological revolution.

I began thinking about the importance of technology for neuropsychological assessment around the same time that Dodrill's presidential address was published. In 1998 I started graduate training in clinical psychology with an emphasis on neuropsychology. I had a background in computer science and electrical engineering from my time in the military and experience in computer networks and database programming. Throughout my neuropsychology training (graduate school, internship, and postdoctoral work), I was struck by the inefficiency of paper-and-pencil assessments and the fact that so many of the tests seemed to fall short of answering the referral questions I received while working in academic medical centers. Most of these tests were slightly modified tests that had been developed decades earlier. In addition to their lack of technological progress, the tests were theoretically questionable as they reflected early approaches to assessment found in non-clinical

disciplines. A good deal of my training was in neurology departments, but most of the neuropsychological assessment tools revealed little correspondence to well-defined neuroanatomic systems. This seemed strange to me given that my work with researchers in neuroscience and computer science revealed many neural systems and modules that interconnected, with relative precision, neurocognitive processes to brain areas. When I compared these experiences with my work using neuropsychological assessment tools, I was frustrated by the imprecision and lack of sophistication of neuropsychological models of cognition. I felt then, and continue to believe, that technological upgrades to neuropsychological assessment tools would allow for clinical neuropsychological assessment data to better comport with functional neuroanatomic/neurocognitive systems.

My interest in computer science and advanced technologies led me to accept a position as a research scientist and assistant research professor position at the University of Southern California's Institute for Creative Technologies. During this time I was able to explore computerized methods for enhancing stimulus presentation, event logging, database development, and neuroinformatic approaches that could link behavioral responses to neurological models.

A few years ago I decided to make the transition into a more traditional tenure position where I would have increased opportunities to train the next generation of neuropsychologists in the application of advanced technologies for neuropsychological assessment. When preparing lectures I was once again struck by the absence of advances in computer science, information technology, and neuroinformatics in clinical neuropsychology. In other neuroscience subdisciplines evidence is readily apparent of advanced technologies, innovative research methods, novel data analytics, and collaborative knowledge bases. Unfortunately, clinical neuropsychology remains rather unchanged and there is little evidence of progress.

In November 2013 I received the early career award from the National Academy of Neuropsychology. At the same meeting, Dean Delis received the Distinguished Lifetime Contribution to Neuropsychology Award. Dr. Delis discussed the evolution of neuropsychological test development and the new frontiers in tablet-based testing. I remember my excitement when I realized that the distinguished lifetime achievement awardee and the early career awardee were both involved in advancing neuropsychological assessment with novel technologies. The following year, in February 2014, I presented two papers at the annual meeting of the International Neuropsychological Society, in Seattle, Washington. One paper was for a keynote symposium on ecologically valid methods of assessment in neuropsychology and the other paper was for a symposium on neuropsychology and technology in the twenty-first century. In addition to comparing paper-and-pencil, computer-automated, and simulation-based approaches to neuropsychological assessment these papers described the potential of virtual reality and information technology for enhancing clinical neuropsychology. Soon after, I began to structure these presentations into this text.

This book reviews currently available technologies that may be useful for neuropsychologists. In addition to enhanced technologies for administration and data capture, there is emphasis on the need for information technologies that can link outcome data to neuroinformatics and collaborative knowledgebases. I understand that this book is a rather ambitious first account of advances in technology for neuropsychological assessment. It is important to note that neuropsychologists need not view these advanced technologies as necessary replacements for current batteries. Instead, it is hoped that the tools described herein will offer neuropsychologists with additional tools that can be used judiciously with current batteries.

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