

Neuropsychology: Looking Ahead

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In most places around the world the term “Neuropsychology” refers to the science of brain-behavior relationships, focusing on linking (mostly) cognitive-behavioral deficits to malfunction of a particular region of brain¹. Based on the patterns of deficits documented by especially designed testing, the neuropsychologist arrives at a presumptive clinical diagnosis, implicates dysfunction in a region in the brain, extrapolates from the cognitive profile to predict a patient’s functional capacity in daily life, and recommends a set of actions that include environmental and behavioral modifications and follow-up with a neurologist. Information obtained about cognitive abilities from the assessment also provides psychoeducation both for the patient and for caregivers. The neuropsychologist often follows the patient periodically (typically annually), to assess for neuropsychological progression of the disorder, to help with diagnostic clarification, and to refine recommendations further. In contrast to some countries in Europe, where neurologists interested in behavioral disorders often refer to themselves as “neuropsychologists”, in the USA, the neuropsychologist traditionally has a non-medical doctorate degree from a department of psychology at a university.

Although the practice of clinical neuropsychology has not changed substantially in the past few decades, the study of the basic mechanisms of perception and cognition has shifted to be the purview of the fields of cognitive psychology, cognitive neuropsychology and cognitive neuroscience. With the birth and expansion of the fields of neuroimaging (structural and functional), cognitive science, computer science and bio(neuro)informatics, genetics (including genomics and phenomics), gene expression, proteomics, connectomics, and of molecular cell biology, neuropsychology has increasingly been excluded from interacting with these fields, and, instead, has been relegated to the clinical evaluation of patients with cognitive deficits arising from diverse pathologies (degenerative, infectious, neoplastic, traumatic, and genetic/developmental). So, the first question is whether neuropsychology should aggressively take possession of the study of the cognitive aspects of disease states or wait also to bequeath this domain to the above-mentioned

disciplines. Second, should neuropsychology make serious attempts to interact with the new emerging bodies of knowledge and thus reinvent itself? We state this at the outset, because we feel that neuropsychology is truly in danger of extinction, unless it undergoes drastic changes, and soon.

Clinical neuropsychology can benefit from the growth of neighboring disciplines, as outlined in a recent article by Robert Bilder². In his article, the advice of which is well worth heeding and even expanding upon, the author outlines specific steps to modernize the specialty. His focus is normal cognition, but one can readily extrapolate his advice to a neuropsychology focused on disease. Thus, he recommends formalizing concepts to be less idiosyncratic and more widely acceptable, measurable, and comparable; he proposes networking these data for universal access via the web; and he advocates innovating assessment approaches relying on computer-assisted methodologies. To this, and taking into consideration advances since that article was published, we can add intelligent machine approaches to help process the huge number of stored neuropsychological data to help with diagnosis and with the selection of best interventions and follow-up schedules³.

There is also a need to revise the neuropsychological understanding of disorders affecting cognition and behavior on the basis of knowledge gained from cognitive science, neuroimaging and genetics, and from advances in medicine in general. However, even the standard clinical experience of neuropsychologists is changing. Thus, for instance, better antihypertensives and earlier treatment of strokes have diminished the incidence of the classical neuropsychological syndromes— aphasia, apraxia, agnosia, alexia, etc. In the USA, furthermore, these syndromes are now seldom seen in acute care hospitals, and, instead, are handled in nursing homes and rehabilitation facilities, where academic interactions are typically reduced. Thus, clinical neuropsychologists in the outpatient setting in acute-care hospitals see mostly chronic stable or chronic progressive disorders arising from problems of development, diseases of aging, including various forms of dementia, and complications of other chronic neurological conditions such as epilepsy,


multiple sclerosis, and vascular disease, as well as chronic medical conditions such as chronic kidney disease, immune-based disorders, and the complications of chemotherapy. Can Neuropsychology develop batteries that will differentiate these new syndromes and aid in diagnosis? The practice of clinical neuropsychology is no longer needed for anatomical localization. Instead, neuropsychology should be about providing objective measures of functioning over time to diagnose disease and track disease progression in an expanding number of medical and neurological conditions affecting cognition and behavior, thus helping to 'crystallize' the pattern of performance when diagnoses are not clear.

That Neuropsychology has been successful over the past 60 years cannot be denied, although this statement may need toning down to reflect the true facts for a handful of languages and cultures only. In a global world, it is important to update first and then adapt the current instruments to a much larger number of ethnic/cultural/language groups. It is still much too frequent an occurrence, even at distinguished academic medical centers in urban, culturally diverse communities such as ours, not to be able to adequately test all of our patients who need testing, who come from widely diverse backgrounds. How many times do we see a patient, a mother for instance, who manages the home perfectly, with all of its financial and organizational intricacies, yet performs very poorly on formal neuropsychological testing? Addressing this discrepancy is not an easy task to accomplish, but should be a high priority for the evolution of the field.

Yes, clinical neuropsychology can continue to do what it has always done well, or, as noted above, it can integrate new knowledge into its practice and study. However, it is also time for neuropsychologists to participate in the treatment of patients with cognitive deficits⁴. Cognitive rehabilitation seems to be naturally the purview of the modern neuropsychologist. Cognitive psychologists and cognitive neuroscientists are not in the business of taking care of patients. Although many of these scientists study patients in order to learn about normal cognitive function, their primary focus is not the improvement or prevention of cognitive deficits. Neuropsychologists, who spend hours with patients in a clinical capacity and continually interact

with other health providers are in an excellent position to fill a very big gap: The management of patients with cognitive disorders, but how?

The data are not strong enough yet to answer this question, and part of the work will be for neuropsychologists to obtain the data. However, we know already of areas that offer the best possibility for progress. Data have emerged to suggest that certain mental exercises, physical exercise, nutrition, control of underlying conditions such as diabetes and hypertension, can have a salutary influence on brain function and on healing from injury. Neuropsychologists have the foundations to translate what they find in their assessments into targeted treatments, especially if they are willing to adopt tools that have emerged over the past decade that modify brain plasticity (for example, magnetic or electrical stimulation). These tools have already been helpful in the treatment of depression. However, where it concerns cognitive functions, more work needs to be done, and neuropsychologists should be the ones doing it. Also, as with pharmacogenomics, where specific genetic profiles can be associated with specific pharmacological treatments, it is even possible to think of linking genetics to neuropsychology in an attempt to personalize the approach of neuropsychological treatment for cognitive disorders⁵.

It is a brave new world, and Neuropsychology should be part of it! 

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