

## Preface

The scientific purview of neuropsychology is to understand healthy and dysfunctional brain-behavior relationships. As our knowledge of such relationships increases incrementally, our understanding of their broad scope and complexities exponentially increases. Whereas it was once thought that specific disorders, such as dyslexia, only implicated one of the cerebral hemispheres (Orton, 1937), research has suggested a more complex interaction between stimuli processing and reading ability, expanding our conceptions of hemispheric specialization affecting healthy and impaired brains (cf. Delis, Kiefner, and Fridlund, 1988; Efron, 1990). Over time, it became clear that intricate brain functions and underlying behaviors, including reading, required linguistic and visual perceptual functions, and necessitated the support of both hemispheres, and therefore, disordered brain functions, including dyslexia, were usually the result of problems affecting both cerebral hemispheric regions. Programmatic research further indicated that the right hemisphere is responsible for processing select aspects of a stimulus (e.g., nonlinear, novel aspects, overall gestalt such as faces), in conjunction with components of the stimulus processed by the left hemisphere (e.g., linear, familiarity of stimulus, details), and the synthesis of these two components subsequently yielded an overall representation (cf. Efron, 1990; Robertson, Lamb, and Knight, 1988). In fact, studies have suggested that information processing in healthy and dysfunctional brains is most likely the result of “contributions from both hemispheres entering into every activity and emotional state” (cf. Lezak, 1995). Therefore, as advances emerged in our understanding of hemispheric specialization, creating paradigmatic shifts and transformations in our conceptualizations, an evolution occurred, altering our previous, incomplete, and “infantile” perceptions about brain functions and their relationships to comportment.

Brain-behavior relationships are not necessarily unidirectional or linear in nature. Neuroscientific and psychoneuroimmunologic studies have demonstrated the intricate nature of these bi-directional and nonlinear relationships. For example, musicians (string players) exhibit thickening and increased cortical representation in their motor strip region underlying string maneuvering secondary to endless hours of practice leading to asymptotically exponential performance and expertise (Elbert et al., 1995). Such cortical structural changes additionally have been noted

with learning in general (cf. Kleim et al., 1997). Support for such a bidirectional and nonlinear view of brain-behavior relationships also has been supported by studies in language development (Bates, Thal, and Janowski, 1992). A specific behavior is capable of altering brain structure, and such transformation is associated with enhanced performance, including new acquisition, competence, and expertise. These examples suggest that the relationship between central nervous system structural alterations and behavioral competence or expertise appears to be exponential and nonlinear in select circumstances. Similarly, psychoneuroimmunology most recently has demonstrated the intimate nature of brain-behavior relationships and their bidirectional interaction. This branch of neuroscience has shown unequivocally that the level of functioning of individuals suffering from AIDS-related dementia was enhanced as a result of interpersonal contextual variables (Kemeny and Gruenewald, 2000). Enhancements in patients' adaptation and functional level was shown to be associated with increments in immune system response, and an increase in T-cell response led to a reduction in viral load and associated changes in brain functions leading to neurobehavioral benefits (e.g., affect, cognition). In this case, the effect of an infectious disease with neurological involvement capable of infringing upon behavior was diminished by an intervention (e.g., touch) with significant impact on immune system response and indirectly on neural substrates and underlying functions.

The relationship between culture and brain also is bidirectional, and in some instances, nonlinear. With regard to our current understanding of neuropsychiatric disorders, lest we are willing to admit intellectual bankruptcy, it is a well-known fact that cultural context is inextricably intertwined with the expression of such phenomena (cf. Mezzich and Lewis-Fernández, 1997). In this regard, and despite its simplistic approach, the *Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition (DSM IV, Appendix)* acknowledges the impact of culture and its modulation on the manifestations of abnormal brain-driven affect, behavior, and cognition (American Psychiatric Association, 1994, 2000). For example, the expression of neuropsychopathology in two different Hispanic patients, or in the same patient at distinct points in time, may vary depending on whether the patient(s) attribute their problems to "*nervios*" a common cultural description of psychological problems or to a known medical condition found in his or her family (Guarnaccia, Lewis-Fernandez, and Marano, 2003). Regardless of the fact that neuropsychopathology in both patients (or in a patient), may have the same neurobiological etiology (e.g., endogenous clinical depression consequent to diminished 5-HT availability in brain), their individual expressions and personal interpretations may be different as a result of their distinct attributions as a consequence of cultural contextualization. In other words, cultural context provides patients, metaphorically speaking, a license that permits them to navigate through the maze of attributions to reach the one that is perceived as most self-preserving, indirectly impacting neural substrates with less negative effects on functional level. Such a context also is critical in the rehabilitation of the Hispanic patient and plays a major role in treatment outcome.

Culture pervades all aspects of an individual's functioning (cf. Luria, 1976, 1979). Culture defines an individual and the individual, beginning early in childhood, constructs his self within such a backdrop, much like an artist who paints with oils a luscious landscape on a canvas. An individual also reactively impacts all societal "institutions" that bear and form his or her definition(s) of the self (cf. Wartofsky, 1983). Most recently, it appears that our brains and culture are interwoven by biological mechanisms, and humans may actually possess "culture" genes that mediate a complex interaction between biology and the environment, providing an interactive mechanism capable of allowing human brains to assimilate cultural characteristics (cf. Kohler et al., 2002; Lai et al. 2001). Therefore, culture is not something to be sprinkled upon our diagnostic considerations, theoretical formulations, clinical impressions, or neuropsychological inferences as if it were of secondary importance or an afterthought, as realism might have been to the impressionist movement. Instead, culture should be an intricate part of all those components in neuropsychological thought and practice, not because it is, as some may argue in our intellectually broken zeitgeist, "politically correct," but because culture is in "our brains" (Ardila, 2003), and culture is to brain what color is to light on the canvas of the impressionists.

Consequently, neuropsychology, a fledging yet maturing discipline, must struggle with culture and ethnicity if it is to remain a viable and comprehensive science of brain-behavior relationships. *Principles of Neuropsychological Assessment with Hispanics: Theoretical Foundations and Clinical Practice in the Neuropsychology and Culture Series* (Spring Science + Business Media) provides a forum in which to examine and explore the influences of cultural factors on brain-behavior relationships from theoretical and applied viewpoints with Hispanics. From a theoretical standpoint, this book will attempt to provide research-based evidence for the impact of culture on brain-behavior relationships while exploring key factors and issues (e.g., assimilation, cultural identity, demographics) partially responsible for such influences. From an applied perspective, clinical issues such as competence and minimal standards associated with appropriate assessments of these populations will be discussed, including ethical approaches to the assessment of Hispanic patients and the development of neuropsychological procedures capable of reducing bias, indirectly leading to accurate and valid evaluations, inferences, and interventions.

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Theoretical Foundations and Clinical Practice

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