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# Overview, Limitations, and Directions

ROBERT J. MCCAFFREY and ANTONIO E. PUENTE

## INTRODUCTION

There is little doubt that individuals with brain injuries constitute a significant segment of our health care population. Of growing concern is the percentage of these patients who are chronic and unresponsive to rehabilitative efforts. Hence, little question should exist as to the importance of addressing the concerns of this population. Traditionally, behavioral or psychological issues have almost always been considered nonexistent or unimportant in addressing brain injury. Fortunately, this erroneous and incomplete approach has evolved to include behavior and, thus, clinical neuropsychology (Puente, 1989).

The inclusion of behavior in the understanding of the effects of brain injury has assumed a belief that behavior is unidimensional and not affected by contextual variables. Specifically, the current understanding of the effects of brain injury on behavior does little to place the patients and their injury in a larger contextual environment. Costa (1988) has argued that while neuropsychological tests are sensitive to brain dysfunction, they are not dysfunction-specific. Costa addresses the need for more research to deal with this lack of specificity. This observation is a function of the need to develop more comprehensive understanding of syndromes and measurement devices. This approach is, however, not enough. For example, new studies call into question the validity of current neuropsychological understanding (Faust & Ziskin, 1988). While one may cogently argue that such criticisms are not only unfair but downright

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misguided (Matarazzo, 1990), the questions are not without foundation. We believe that the question of validity can be best answered by placing the patient's behavior in the context of a wide range of biopsychosocial variables rather than by developing more "specific" tests, as Costa (1988) has suggested. To do otherwise would continue to produce an incomplete understanding of brain function.

This logical orientation has been interwoven into related disciplines. For example, Moccaci (1984) has argued that social, cultural, and related factors are taken into account when understanding basic psychological processes but tend to be neglected when considering neuropsychological factors. Moccaci cites extensive evidence on how cultural variables affect hemispheric processing and also suggests that neuropsychological approaches to the understanding of brain function need to address these contextual variables.

### SCOPE AND LIMITATIONS OF THE PRESENT VOLUME

First and foremost, this volume is not intended as a replacement or competition for such excellent treatises in neuropsychological assessment as Lezak's *Neuropsychological Assessment* (1988), Franzen's *Reliability and Validity in Neuropsychological Assessment* (1989), and others. Indeed, it would seem foolish to attempt to supercede the work of these authors since they present an excellent overview of several major aspects of assessment. The orientation of these contributions, however, has typically been psychometric in origin with the most powerful and useful knowledge being that of the instrument itself.

Other texts focus on understanding a specific behavioral problem. For example, Squires (1987) places critical importance on understanding memory disorders rather than on the tests that measure such impairments. Again, Squires and others have done an admirable job in presenting their approach to the understanding of brain dysfunction.

Unfortunately, knowledge of the syndrome and the tests used to measure the signs and symptoms of the disorder is not enough to adequately assess brain dysfunction. Technical expertise is no replacement for clinical sensitivity. Missing in these two orientations (i.e., tests and syndrome knowledge) is the importance of understanding the patients in their context whether it be biological, demographic, psychological, social, and/or environmental. Placing the patients in the context of their life's situation increases the validity of our neuropsychological understanding. To do otherwise, undermines the ultimate criterion in clinical neuropsychology—accurate understanding of neuropsychological function and dysfunction.

This volume is not meant to replace or supercede existing neuropsychological knowledge but to supplement our existing knowledge base. This compendium of contributions adds and enhances to this existing body of knowledge with an understanding of the tests and syndromes as a prerequisite to the

application of the information found in this book. After all, the major direction of each chapter is how specific variables affect performance on neuropsychological tests.

## OVERVIEW

The present volume represents an attempt on the part of scientists and practitioners to address the role of fundamental biopsychosocial variables in both basic research and the clinical application of neuropsychology. The importance of considering constitutional and demographic factors was addressed in Part I. The importance of considering the subject/patient in the context of his or her developmental period across the life span was addressed by considering many populations—perinatal and infants, children, adults, and geriatric. Emory *et al.* outlined the significance of considering perinatal factors in the neuropsychological assessment of both infants and older children. Moreover, the possible link between perinatal complications in the offspring of individuals at genetic risk for the development of forms of psychopathology, such as schizophrenia, underscores the importance of assessing for these types of factors. The chapter on childhood factors underscores the importance of developing both assessment procedures and instruments that are specific to the child's developmental period. Children should not be viewed as downward extensions of adults. Along these same lines, the chapter on adult development and aging highlights the importance of differentiating normal cognitive changes from those associated with disease processes and/or affective states. An important factor is the need to consider the patient relative to appropriate norms. For example, it would be inappropriate to compare patients with chronic medical illnesses to healthy, older adults. Such a comparison could conceivably result in a significant misdiagnosis.

A consideration of sex and gender differences is an important endeavor in neuropsychological assessment in its own right. The importance of including these types of variables in both neuropsychology and related areas has recently been highlighted by the National Institute of Health's policy indicating the inclusion of females in studies.

The study of handedness and the lateralization of hemispheric functioning provides an opportunity to study the brain's organization of cognitive functioning. Knowledge of factors associated with lateralization of functioning is especially important when designing an implementing remediation and rehabilitation program following insults to the brain.

The role of bilingualism as an important variable in both basic and applied neuropsychological assessment is an important issue as outlined by Manuel-Dupont *et al.* and is one that is likely to continue to demand the attention of clinical neuropsychologists as the population of bilingual citizens in the United States increases. Coupled closely with the issue of bilingualism is the role of

sociocultural factors in basic and applied clinical neuropsychology. As detailed by Ardila *et al.*, this issue goes to the heart of understanding patients in the context of their life and underscores the importance of developing norms based on diverse populations, in order not to confound sociocultural factors with neuropsychological dysfunction. In fact, the impending revisions of the *Ethical Principles of Psychologists* highlight the importance of understanding the patient in the context of his or her life.

Part II dealt with psychopathological factors as they are likely to influence the evaluation of patients with known or suspected CNS dysfunction. Research into the neuropsychological bases of the anxiety, depressive, and schizophrenic disorders is important since it is likely to increase our understanding of the underlying physiological bases of these disorders. The role of neuropsychological assessment in evaluating these types of disorders is not only useful in terms of differential diagnosis of psychopathological factors from underlying organic factors but is also useful in providing behavioral correlates of changes associated with other assessment procedures such as neurological exams, neuroimaging, basic biology, and other variables. As highlighted by Orsillo and McCaffrey, subject selection factors, changes in the DSM-III's diagnostic criteria, and a failure on the part of the investigators to provide detailed descriptions of patient samples (e.g., handedness, coexisting medical conditions) may have contributed to the discrepancies reported in both the clinical and research literature. In addition, the failure to evaluate and/or control for other variables appears to have added to the contradictory findings, especially with regard to the results of PET scans with panic disordered patients. Specifically, Mountz, Modell, Wilson, Curtis, Lee, Schmaltz, and Kohl (1989) found that hyperventilation, a correlate of state anxiety, has a profound influence on changes in patients' PET scans. The importance of understanding both the neuropsychology of depressive disorders and the interaction of depressed states with various underlying medical conditions was highlighted by Newman and Sweet. Their review indicating that magnetic resonance imaging studies have localized structural changes in the brains of patients with affective disorders highlights the importance of consideration of the role of depressive deficits in both basic and routine clinical neuropsychological assessment.

Neuropsychology had a great deal to contribute to the scientific investigation of schizophrenia. While there is little evidence to indicate that patients with the diagnosis of schizophrenia share a common organic impairment, Walker *et al.* note that the neuropsychological performance profiles may be related to the symptom profiles of patients with the diagnosis of schizophrenia.

The practicing clinical neuropsychologist is also likely to be called upon to assist in the evaluation of patients where a suspected pseudoneurological disorder may be present. The differential diagnosis of neurological versus pseudoneurological has important implications in terms of care and treatment of individual patients as outlined by Horton. Another area of increasing importance for the practicing neuropsychologist is the detection of deception and

malingering in patients who have sustained some form of CNS trauma. While the detection of deception for possible secondary gain is an important factor in the care and treatment of the individual patient, Binder also notes that this area is one that has important implications in terms of providing forensic neuropsychological services.

Part III focused on biological and environmental factors. Biological and environmental factors present a set of important variables to be considered when evaluating diverse groups of medical patients. The chapter on peripheral motor and sensory disorder by Delay and Isaac highlights the importance of a thorough working knowledge of both the peripheral as well as central nervous system when interpreting a patient's complaints and neuropsychological profile. The chapter on cardiovascular and somatic disorders by Lorig reviews a number of medical conditions that are likely to be important factors in the neuropsychological evaluation of patients in a medical setting. Uzzell's chapter provides a pertinent overview of the sequelae associated with neurosurgical interventions.

The abuse of psychoactive substances is a major health problem in the United States and, as such, is likely to be a confounding factor in the neuropsychological assessment of patients who have sustained trauma to the CNS from motor vehicle accidents. In addition, the abuse of psychoactive substances is also an important issue in the designing and implementation of substance abuse treatment services. As such, the clinical neuropsychologist may be called upon not only to evaluate patients with a history of substance abuse but also to provide treatment recommendations and long-term postcare recommendations.

The growing concern over the environment and presence of neurotoxins in the environment, especially the workplace, has led to the emergence of the field of neuropsychological toxicology. As outlined by Hartman, the area of neuropsychological toxicology is likely to continue to show considerable growth both in terms of basic research and also in terms of medicolegal issues. Given that the area of neuropsychological toxicology is relatively new, a great deal of basic research needs to be conducted. The application of clinical neuropsychological assessment techniques and procedures is expected to have a profound and important impact in evaluating the impact of neurotoxins in our environment.

There are many variables that affect performance on a neuropsychological test. This book was intended as a comprehensive presentation of the major variables involved with the assessment of brain dysfunction using clinical neuropsychological tests. Nevertheless, other variables could be playing a (*potentially significant*) role in this situation. Additional clinical experience and research should uncover these variables.

Some of these variables are obvious and have been addressed in limited fashion within several of our chapters and in previous contributions. For example, Tarter, Van Thiel, and Edwards's (1988) edited volume *Medical Neuropsychology* presented the interface between a variety of medical disorders (e.g., renal failure) and neuropsychological performance. In the present book, several contributors address these and related issues to some extent (e.g., see Delay and

Isaac). Thus, the medical status of the patient plays a critical role in mediating neuropsychological performance. Other variables may be even more obvious. Reynolds and Fletcher-Janzen's (1989) *Handbook of Clinical Child Neuropsychology*, for example, outlines in detail how developmental factors affect neuropsychological function. In this volume, three separate chapters address developmental issues across the life span.

A number of other variables are much less obvious and are less understood. Some of these variables are biological. For example, race probably plays a more significant role in brain function and dysfunction than commonly thought. Unfortunately, sociopolitical issues have clouded the necessary research that needs to be performed. If one draws from recent sociopsychological literature (Jones, in press), it may be that within-race differences may actually be larger than between-race differences if critical confounding variables (e.g., socio-economic status) are held constant. Regardless, the question of race and other biological variables needs to be empirically addressed.

Other variables equally ignored include demographic factors and long-standing personality traits and disorders. Matthews in this volume discusses sex differences in a variety of tasks. However, the issues of gender and sexual orientation, while difficult to address, may be as important as biological sex. Though yet unpublished, Henninger-Pechsted (personal communication, 1990) has been examining the role of hemispheric dominance in multiple personality disorders. One of her basic assumptions includes the role of the dominant hemisphere in modulating undesirable affect resulting from early traumatic experiences.

Other variables may be even more speculative than those previously considered in this section. These include a host of other biological (e.g., metabolic rate), demographic (e.g., religion), and other personality (e.g., Axis II disorders) variables. Until such knowledge is more commonly available, caution should be used before ruling out the importance of any of these variables in understanding neuropsychological deficits.

In anticipation of this body of knowledge, we welcome suggestions and directions on how these and other variables manifest themselves in neuropsychological functions.

## SCIENTIFIC MODEL OF CLINICAL NEUROPSYCHOLOGY

The primary goal of the neuropsychologist is to conduct a scientifically correct but clinically sensitive evaluation of a broad spectrum of patients. As such, the clinical neuropsychologist must have an appreciation and an understanding of the basic issues surrounding the diversity of both patients and medical/psychiatric disorders. The most recent draft of the Ethical Principles of the American Psychological Association emphasizes the importance of understanding the patient in the context of his/her life. The performance of scientifically correct but clinically sensitive evaluations incorporating diversity issues

poses a unique challenge to the clinical neuropsychologist. In this regard, the role of the clinical neuropsychologist must go beyond the level of assessor only. Increasingly, clinical neuropsychologists are in positions in which they are asked to make predictions and/or provide treatment/rehabilitation options on issues for which there is a limited scientific basis upon which to draw. This challenge must be addressed by both the individual practitioner and the field in general.

### METHODOLOGICAL ISSUES: CONFLICTUAL FINDINGS

At the present time, there are a number of areas in clinical neuropsychology in which there are conflictual research reports. The presence of conflictual findings ought not to be viewed as a source of irritation but rather as representing a challenge to the field. Specifically, there are a number of factors that are either known or presumed to be important mediating variables in clinical neuropsychology. In fact, the intent of the present volume was to begin the process of considering these potentially important variables in general clinical neuropsychological assessment. Included among these mediating variables are subject selection factors, diagnostic criteria, education, IQ, cultural factors, learning disabilities, and developmental disabilities. While basic research into each of these issues has been—and is being—conducted, our knowledge of the impact of these factors is far from complete. Thus, it should come as no surprise that conflictual results are often found in both the basic and clinical research literature. For example, Orsillo and McCaffrey in their review of the anxiety disorder literature note that there have been marked discrepancies in terms of the criteria used in arriving at the diagnosis for various anxiety disorders. In addition, investigators in this field often have failed to obtain basic information associated with such important factors such as handedness and the role of state versus trait anxiety. The conflictual findings based on the use of PET scans to evaluate the neurophysiology of panic disorders appear to be related to the failure to control for the presence of hyperventilation (Mountz *et al.*, 1989).

In the clinical domain, there are also often reports of contradictory findings. For example, the efficacy of attention-remediation training in patients who have suffered a traumatic brain injury is an applied area of clinical neuropsychology in which contradictory findings are the norm (see McCaffrey & Gansler, *in press*, for review). The attention-remediation studies often assume that traumatically brain-injured patients represent a homogeneous population based on some set of post-TBI criteria. Moreover, basic variables such as the extent and duration of coma, time since TBI, handedness, medication regimens, concurrent medical conditions, and other variables are often not reported. In terms of evaluating the efficacy of the treatment intervention, factors such as the role of spontaneous recovery of function are often not considered. The presence of discrepant research findings highlights the importance of both considering and investigating basic biopsychosocial variables in both basic research and the clinical application of neuropsychology.



## FUTURE ROLES IN APPLICATIONS OF CLINICAL NEUROPSYCHOLOGY

The statement that "psychology has a long past, but only a short history" is attributed to Ebbinghaus (Boring, 1950). In many ways, this statement is equally applicable to the area of clinical neuropsychology. As in other areas of psychology, it is important that the clinical neuropsychologist be trained as a scientist-practitioner in order to meet the challenges confronting the field. The field of clinical neuropsychology has witnessed a rapid growth during the decade of the 1980s. Education for competency assurance in clinical neuropsychology has been, and continues to be, an important issue (Meier, 1981; International Neuropsychological Society Task Force, 1981). In the mid-1980s, several reports appeared evaluating the educational background and specialty training of instructors of clinical neuropsychology in graduate training programs (McCaffrey & Isaac, 1984), the educational backgrounds of the clinical neuropsychologists in APA-approved internship sites (McCaffrey, 1985), internship opportunities in clinical neuropsychology emphasizing recent INS training guidelines (McCaffrey, Malloy, & Brief, 1985), and the availability of neuropsychological training in APA-approved counseling psychology programs (Solomon, Hale-Fiske, McCaffrey, & Orabona-Roman, 1985). Results of these surveys indicated that there was a growing demand for training in neuropsychology at both the graduate training level and the internship level. Unfortunately, the educational background and specialty training of instructors in both graduate programs and APA-approved internship sites lagged far behind the minimal criteria as outlined by Meier (1981). The results of a recent national survey of psychologists who offer neuropsychological services found that the modal psychologist is only tangentially involved in neuropsychology (Guilmette, Faust, Hart, & Arkes, 1990). Distressingly, the modal practitioner performs less than one neuropsychological assessment a month and his/her formal educational background in specialty training falls far short of the INS/Division 40 Task Force recommendations for neuropsychologists.

Despite the fact that the types of surveys summarized above may be criticized based on methodological grounds, it nonetheless appears that we have failed to see an implementation of the INS/Division 40 guidelines for training in clinical neuropsychology during the decade of the 1980s. The training of clinical neuropsychologists in a scientist-practitioner model remains a problem in need of solution for the decade ahead.

The issue of diversity in understanding patients in the context of their lives will require an effort on the part of the clinical neuropsychologist to develop norms for diverse populations. Along these same lines, it will be necessary to develop flexible clinical neuropsychological assessment batteries and individual assessment instruments that are adaptable to individual patients and not necessarily specific to particular disorders. In addition, there is likely to be increasing pressure from third-party insurance carriers requesting that rehabilitation programs be based on an individual case-by-case approach guided by firm scientific data as to the efficacy of various rehabilitation or remediation therapies (see McCaffrey & Gansler, in press).

Another important issue is the further development of neuropsychological assessment instruments designed specifically to evaluate patients in the context of their developmental period, current life and related factors, in order to increase the generalization of neuropsychological assessment findings. Moreover, it will be necessary to continue to develop, validate, and evaluate new assessment procedures and approaches for use by clinical neuropsychologists with diverse populations. For example, there are few neuropsychological assessment procedures for evaluating executive functioning.

## CONCLUSION

The goal of this volume has been to sensitize clinical neuropsychologists to a host of contextual variables in neuropsychological assessment. We anticipate that the major variables have been covered in some fashion in these chapters. Nevertheless, it is anticipated that other variables will eventually warrant further evolution and consideration. What will not change, however, is the importance of assessing the client in a comprehensive biopsychological framework.

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