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MULTICULTURAL HANDBOOK OF SCHOOL PSYCHOLOGY

An Interdisciplinary Perspective

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NEUROPSYCHOLOGICAL ASSESSMENT OF CULTURALLY AND LINGUISTICALLY DIVERSE CHILDREN: A REVIEW OF RELEVANT ISSUES AND APPROPRIATE METHODS

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Drawing from the fields of anatomy, biology, biophysics, ethology, pharmacology, physiology, physiological psychology, and philosophy, neuropsychology is the study of the relationship between human brain function and behavior (Kolb & Whishaw, 2003). According to Lezak (1995), the field of neuropsychology has grown to encompass the diagnosis of individuals, patient care and planning, rehabilitation and treatment evaluation, and research with regard to neuropsychological functioning. Assessment continues to be emphasized as a component of neuropsychology, and it typically involves an evaluation of the following domains: intellectual status, language and academic abilities, executive processes, attention, concentration, learning and memory, visuoconstructive abilities, motor functioning, sensory functioning, and emotional functioning, including mood, behavior, and personality (Groth-Marnat, 2000; Lezak, 1995; Spreen & Strauss, 1998).

The neuropsychological assessment of children has historically involved a downward extension of adult neuropsychological assessment practices (Marlowe, 2000). However, the application of adult inferences and hypotheses to children's development fails to address known differences in the functional organization and development of the infant-child brain (Riccio & Wolfe, 2003). Assessment of

neuropsychological functioning in children requires a thorough understanding of the relationship between the development of the human central nervous system and the cognitive functions that emerge between birth and adulthood (Batchelor, 1996). There are several concerns that arise when assessing the neuropsychological development of children. These concerns include the dynamic, continuous, and rapid development of children that may affect the accurate establishment of baseline performance; poorly documented prenatal and perinatal histories; environmental effects such as poverty; and, the failure of caretakers to provide accurate developmental histories for their children (Batchelor). Furthermore, differences exist in course and outcome of disorders in children and adults, which is an important factor in recognizing the relevance of child neuropsychology as a distinct specialty (Riccio & Wolfe).

The neuropsychological assessment of children and adults can be further refined to address the needs of individuals who are culturally and linguistically diverse (CLD). According to Nell (2000), the assumption that the neuropsychological functioning of individuals can be approached from a universalist perspective, as is physiological functioning, can lead to a number of concerns. The neuropsychological functioning of individuals is not free from the effects of variables such as language, culture, age, and education; however, the specific effect of each is poorly understood especially when children and youth are involved (Ardila, Rosselli, & Puente, 1994; Puente, Mora, & Munoz-Cespedes, 1997). Current standardized neuropsychological instruments typically do not identify the effects of these variables. While difficult, the work of developing and standardizing new neuropsychological instruments for use with CLD populations is essential if individuals representing a variety of cultures and languages are to be effectively assessed (Lamberty, 2002). As most neuropsychological tests designed for adults fail to address the needs of CLD populations, and as much of the research relating to the neuropsychological functioning of CLD individuals has been conducted with adults rather than children, the applicability of results gathered from such testing for CLD children is often questionable (Marlowe, 2000).

It is commonly understood that there is little agreement on the definitions of culture and ethnicity (Organista, Chun, & Marin, 1998). Sue and Sue (1990) noted that culture "consists of all those things that people have learned to do, believe, value, and enjoy in their history. It is the totality of ideals, beliefs, skills, tools, customs, and institutions into which each member of a society is born" (p. 35). The concept of ethnicity "often refers to group-shared patterns of social interaction, values, social customs, behavioral roles, perceptions, and language usage" (Canino & Spurlock, 2000). For the purpose of this chapter, the concept of cultural and linguistic diversity refers to the range of different cultural and linguistic identities that may be applied to children. Ethical guidelines recommend that psychologists assess children with techniques that address their specific cultural and linguistic backgrounds.

Traditional cultural classifications may not provide the specificity that is necessary for an adequate assessment. One should not assume, for example, that grouping all Hispanic or Latino children in the same category is acceptable, as the specific subgroup that the child belongs to (i.e., Mexican or Puerto Rican) may be more use-

ful. It would be beyond the scope of this chapter to discuss neuropsychological functioning in children with respect to their specific cultures and languages. In response to these limitations, this chapter will use the term CLD when referring to any child who is not of the perceived mainstream American culture and/or dominant in the English language. The practices defined in this chapter are therefore generalized to a broad range of cultures and languages, and must be further refined by the practitioner. The terms child and children in this chapter, will refer to individuals at developmental stages from birth to late adolescence.

This chapter will review relevant issues and provide a basic framework of effective techniques that will assist school psychologists confronted with the need to perform a neuropsychological assessment on CLD children and adolescents. After a discussion of relevant terms, this chapter will review several theoretical approaches with respect to current assessments of CLD children. A description of each domain of neuropsychological functioning will be presented and adapted to address the unique challenges posed by the assessment of CLD children. Recommendations for such adaptations and their effective application will be offered for each domain of functioning. Specific examples of best practice and clinical issues, implications for research, and a brief bibliography of relevant literature will be provided.

THEORETICAL AND RESEARCH BASES

The application of neuropsychological theory, techniques, and methods when evaluating children, who may or may not be suffering from a neurological disorder, is a recent development in the field, since clinical neuropsychology and neuropsychological theory progressed as a discipline for the purpose of evaluating the results of adult brain injury (Holmes-Bernstein & Waber, 1990). In current neuropsychological practice, there exists a change of emphasis from the localization of brain lesions to the assessment of change in cognitive functioning, representing a shift of focus from the study of group differences to the study of intraindividual change (Baron, 2004). Similar to the field of adult neuropsychology, there is little agreement in the field of child neuropsychology as to how to perform a neuropsychological assessment on a child, what the best measures or techniques are, or how to interpret particular findings (Holmes-Bernstein & Waber). Nevertheless, there does appear to be agreement that all child neuropsychology evaluations need to take a child's developing nervous system into account. Child neuropsychologists have strongly noted that children's test performance is quantitatively and qualitatively different than that of adults (Fletcher & Taylor, 1984; Hale & Fiorello, 2004). Children and adults will also manifest brain pathology in different ways, leading to distinct behavioral problems (Riccio & Wolfe, 2003). Additionally, a child's brain is considered to be more neurologically plastic than an adult's, resulting in a higher potential for recovery or reorganization of affected areas (Riccio & Wolfe).

Although there is no single agreed upon method to assess a child's neuropsychological functioning, practitioners have historically espoused either a fixed (a set of predetermined tests) or flexible (a set of tests specifically chosen for a particular child) test battery approach to assessment. Theoretical issues, research studies, and practical restraints may underlie an examiner's decision to use either approach (Bornstein, 1990). Because flexible batteries are more time and cost efficient, they have become more popular, whereas the fixed battery approach predominated in the early history of neuropsychological assessment (Hale & Fiorello, 2004). The fixed battery approach recommends the use of a "predetermined set of measures that samples behavior in areas of interest. In this approach, it is intended that that all patients be given the complete set of tests, regardless of the patient's presenting problems, suspected etiology, or reason for referral" (Bornstein, p. 283). The advantages of the fixed battery approach are the ability to amass a great deal of data for research purposes using a wide variety of measures and the potential to compare different diagnostic groups across particular deficit profiles (Bornstein).

The flexible battery approach is less useful for research purposes but is more client-centered and clinical in nature. The examiner uses the information initially revealed by the client to determine the tests to be administered, and the goal in this approach is to determine the reason for and nature of the client's deficits (Bornstein, 1990). The choice in the selection of tests is therefore not predetermined, but rather develops as the examiner learns more about specific issues confronting the client. Current approaches to neuropsychological testing seem to adopt a combination of both the fixed and flexible battery approaches, whereby "tests batteries are designed to respond to specific questions that arise within particular diagnostic populations" (Bornstein, p. 285).

A major principle of neuropsychological theory is that the observation of behavior can assist in making inferences regarding the brain's functioning. Due to neurodevelopmental differences and the functional organization of the brain as children mature, this theory does not accurately portray the young. Neurodevelopment occurs over a predictable course, with only the primary cortical areas being developed by birth and other areas continuing to develop into adolescence (Riccio & Wolfe, 2003). The cortical areas that develop later in childhood and adolescence include those areas of the brain involved in higher order processing, such as learning, memory, attention, cognition, emotion, and language. Despite advances in neuropsychological theory, Riccio and Wolfe state that researchers have only recently begun to understand the complicated nature of the changing organization of brain function in children throughout the lifespan. The nervous system matures according to a predetermined pattern, commencing as a neural tube and gradually gaining characteristics of the adult brain. There are four major phases in the development of the nervous system: neurogenesis or the birth of neurons; neuronal migration to the appropriate location; differentiation and maturation of neurons; and, cell death and synaptic pruning (Kolb & Fantie, 1997). For a detailed description of the development of the child's brain and associated behavior, please refer to the Bibliography of relevant literature for suggested readings.

IMPLICATIONS FOR PRACTICE

According to Reynolds and Fletcher-Janzen (1997), child neuropsychology is no longer confined to the clinical setting, but is present in the schools. In the school setting, "personnel actively assess soft neurological signs (that may or may not affect learning) and they communicate directly with child neurologists and neuropsychologists who evaluate the hard neuropsychological signs" (p. xi). As neuropsychological issues become more prominent in school systems, school psychologists may be called upon to evaluate neuropsychological functioning. School psychologists are commonly exposed to children with various neurological syndromes such as epilepsy and autism, as well as those children recovering from traumatic brain injury, brain tumors, and pediatric stroke.

The neuropsychological assessment and treatment of children represents a distinct challenge requiring specific training that may or may not be included in the repertoire of a traditional school psychologist. According to the American Psychological Association's (APA) Division of Clinical Neuropsychology, a proficient neuropsychologist must demonstrate evidence of successful training in neuropsychology and neuroscience at an accredited university, two or more years of supervised training of the application of neuropsychological services, formal licensing and certification, and peer review of competency (APA, 1989). When appropriately trained, the school psychologist can serve as a case manager, consultant, evaluator, and counselor to children with needs stemming from neurological conditions (Walker, Boling, & Cobb, 1999). A developing focus on neuropsychological issues is reflected in the National Association of School Psychologists' (NASP) standards for training and field placement programs in school psychology (NASP, 2000). According to Walker et al., "the broadening of the role of the school psychologist into the areas of neuropsychology and brain injury seems to be a natural progression of their training" (p. 138).

School psychologists who have received training in providing neuropsychological services to children should be cognizant of the specific factors that impact upon the assessment of CLD children. For example, when reviewing the use of neuropsychological tests for CLD populations, several issues arise. Such issues include the use of too few individuals from diverse cultures in the standardization of instruments (Horton, Carrington, & Lewis-Jack, 2001); specific problems related to translation of tests (Ardila, Rosselli, & Puente, 1994; Cohen & Spenciner, 1998; Sattler, 1988); as well as the paucity of information pertaining to the behavioral and social-emotional assessment of CLD individuals (Merrell, 2003). When conducting neuropsychological assessments of CLD children, concerns are even more pronounced. The combination of the fields of child neuropsychology and multicultural neuropsychology into the interdisciplinary field of neuropsychological assessment of CLD children and adolescents represents an initial effort to establish a clinical and research base for an underserved population. It is a challenge, therefore, to utilize a scientist-practitioner model to ascertain best practice for comprehensive neuropsychological assessments of

CLD children and adolescents that result in valid findings and guide appropriate treatment. However, given that school psychologists are increasingly involved in the neuropsychological assessment of CLD children, it is important that they have guidelines that provide a framework for these assessments. The next section suggests domains of functioning to assess and special considerations for the assessment of CLD children.

IMPLEMENTATION AND APPROACHES

There is a wide range of domains of functioning investigated by neuropsychologists in a general child neuropsychological evaluation. For example, clinical and family history, behavioral observations, attention and concentration, language ability, verbal and nonverbal memory, intelligence, executive functioning, visual-spatial skills, processing speed, emotion, and behavior are among the domains that may be included in a comprehensive neuropsychological assessment. The following sections will discuss components of a comprehensive neuropsychological assessment with an emphasis on the areas that should be highlighted in the assessment of CLD children: level of acculturation, language proficiency, and language development.

Acculturation level. The effect of acculturation on an individual's performance on cognitive tests has been well documented (Gopaul-McNicol & Armour-Thomas, 2002). However, there remains a "notable absence of a body of established and cohesive research directly relating multicultural concerns to neuropsychological assessment" (Friedman & Clayton, 1996, p. 292). The assessment of neuropsychological functioning is not free of the cultural and racial biases that are commonly found in other psychological assessments (Horton, Carrington, & Lewis-Jack, 2001). Most psychological research defines the concept of acculturation as the learning of culture that occurs due to contacts between members of two or more groups (Berry, 1980). Acculturation is a complicated process that can occur at both the societal and the individual level (Szapocznik, Scopetta, Kurtines, & de los Angeles-Aranalde, 1978). Earlier definitions of acculturation proposed that individuals lost or discarded their native culture and language, however, it has been more recently defined as a fluid process that includes an ongoing interchange involving adaptation and adjustment in the beliefs, values, and behaviors of people who have migrated to a new culture (Guarnaccia & Rodriguez, 1996; Marin, 1992), without the intentional or unintentional loss of beliefs, values, and behaviors of their native country. Of great importance to the understanding of acculturation is that it is conceived as a fluid and unending process (Berry, Trimble, & Olmeda, 1986).

Echemendía and Julian (2002) have described the measurement of the acculturation of children as potentially more complex than the measurement of adult acculturation. When evaluating the acculturation of children, it is important to consider family contexts and sociocultural factors within the home and neighborhood environments. The evaluation of acculturation level for adolescents is further con-

founded by struggles with ethnic/racial identity and “issues regarding adulthood vs. childhood” (Echemendía & Julian, p. 186).

Berry (1980) has suggested that there are six areas of psychological functioning where acculturation has a direct effect: language, cognitive styles, personality, identity, attitudes, and acculturative stress. Berry argued that, as an individual undergoes the process of acculturation, changes occur in each of these six areas. As many of these areas strongly relate to the process of a neuropsychological assessment, it is essential that a CLD child’s acculturation level be assessed prior to the evaluation of functioning in other domains. According to Gopaul-McNicol and Armour-Thomas (2002), this information is typically identified through the administration of a checklist, rating scale or questionnaire. These tools enable an examiner to “seek information about an examinee’s value orientations, language dominance and proficiency, prior knowledge, culture-specific attitudes, food practices, level of participation in ethnic organizations, and traditional holiday celebrations” (Gopaul-McNicol & Armour-Thomas, p. 56). It is also important to gather information regarding immigration circumstances, community and school factors affecting acculturation, familiarity with and attitude toward formal testing practices, home language, financial stability, SES in the host country and country of origin, and other factors in a thorough clinical interview (Echemendía & Julian, 2002).

Language proficiency and development. An essential component of a neuropsychological evaluation of a CLD child is the assessment of language proficiency (Harris, Echemendía, Ardila, & Rosselli, 2001; Puente & Ardila, 2000; Rogers, 1998). Language proficiency impacts upon many facets of the CLD child’s functioning, such as learning, socialization, and acculturation. According to Gopaul-McNicol and Armour-Thomas (2002), acculturation level and language proficiency are interdependent, despite their theoretical distinctions. A CLD child is likely to be bilingual or multilingual and alternating intermittently between each language (Centeno & Obler, 2001). A valid neuropsychological assessment, therefore, should consider a child’s language proficiency in native and second languages.

Several factors may influence CLD children’s linguistic abilities and expertise such as age, cognitive ability, sequence in which languages were acquired, dominant academic language, language context, attitudes toward each language, verbal ability, as well as neuropsychological and organic factors (Puente & Ardila, 2000). For example, Cummins (1984) suggested that younger children more quickly acquire a second language than older children. It has been suggested that monolingual children be assessed in their dominant language and bilingual children be assessed in their first and second languages (Rogers, 1998). It is also important that a thorough history of the development and use of each language be assessed as this may influence the choice of language for the assessment. For example, evaluating a child in her or his native language because the child speaks that language at home may be inappropriate if the child is more proficient and comfortable communicating in her or his second language. Additionally, throughout the process of acculturation, language dominance may shift between native and second languages.

When assessing language proficiency, it is also important to consider the differential development of basic communication second language skills and the ability to use a second language on academic and cognitively demanding tasks (Cummins, 1984). Cummins suggests that the ability to converse at a basic level develops within the first two years of exposure to a language, while the ability to effectively utilize a second language in an academic setting requires five to seven years of exposure. Therefore, the evaluator must keep the differential rate of second language skill development in mind when evaluating and interpreting the child's linguistic skills. Furthermore, as children gain second language fluency, their first language skills may regress (Fradd, Barona, & Santos de Barona, 1989). It is important, therefore, to obtain current language proficiency results prior to conducting the neuropsychological evaluation of a CLD child.

The examiner conducting the neuropsychological evaluation must be familiar with the language development of CLD children so that disorders are not inaccurately diagnosed or overlooked. For example, the mixing of words and phrases between languages is a common behavior exhibited by many CLD children that does not necessarily reflect a neuropsychological deficit (Puente & Ardila, 2000). In addition to formal testing, informal conversation with a CLD child in both languages may provide additional insight into her or his higher reasoning skills, language organization ability, attention, as well as other domains of functioning.

Although a common practice when working with CLD individuals is the use of interpreters and translators to assist in the neuropsychological assessment, this practice is highly discouraged (Ardila, Roselli, & Puente, 1994; Harris et al., 2001; Puente & Ardila, 2000; Rogers, 1998). Interpreters and translators may not be familiar with the purpose, concepts and terminology of psychological tests and may create translations that although are literally correct do not make sense to the examinee (Puente & Ardila). Subtleties of the examinee's behaviors may also be overlooked. Additionally, administering a translated version of a test, standardized and normed in English, may alter the psychometric properties of the test (Puente & Ardila; Rogers). Therefore, it is important that examiners be proficient in the child's dominant language and personally administer all tests in the neuropsychological battery.

When collecting information regarding language functioning, the examiner should be aware that neuropsychological delays in language can be evident in both the native and second language as seen in the "characteristics of acquired aphasia, dysarthria, apraxia, and traumatic brain injury" (Rhodes, Kayser, & Hess, 2000, p. 326). Once acculturation level, language proficiency, and language development have been adequately assessed, the examiner can be more confident in assessing other, more traditional domains of neuropsychological functioning.

Clinical interview and behavioral observations. Gathering specific information pertaining to the child's background is one of the initial stages of any comprehensive neuropsychological assessment. A detailed summary of historical information improves the examiner's ability to establish rapport, identify cultural variables, conduct valid assessments, provide accurate diagnoses, and design ef-

fective interventions (Sattler, 2001). Clinical interview and behavioral observation data provide the examiner with information that is important to the interpretation of the examinee's performance on other measures in the neuropsychological battery (Strub & Black, 1993).

While acquiring the necessary background history, the examiner gathers information from behavior observations, family or caretaker interviews, and a child interview. According to Strub and Black (1993), the clinical history may include a description of present illness, relevant organic behavioral symptoms, and psychiatric symptoms as well as birth, developmental, academic, and family histories. Additionally, a thorough developmental history should provide a review of pregnancy, labor, and delivery; acquisition of developmental milestones in language, motor, behavioral, and emotional domains; illnesses, accidents, drug and alcohol or toxin exposure; and, hospitalizations that may be relevant to present levels of functioning.

Despite the informal nature of the clinical interview, this process is susceptible to the same cultural concerns raised by more formal measures. Families in some cultures may have a greater or lesser degree of involvement with the interview process. Individuals from certain cultures may be more or less hesitant about discussing personal or family problems with non-family members (Sattler, 2001). Newly immigrated families may be preoccupied with pressing issues such as seeking housing and employment. For many CLD groups, extended family members should be involved in the interview process, as they play a significant role in child-rearing (Gopaul-McNicol & Armour-Thomas, 2002). Issues of loyalty and respect for elders may impact upon the CLD child's willingness to discuss negative feelings about parents to a stranger (Gopaul-McNicol & Armour-Thomas). Variations in cultural norms regarding eye contact, facial expressions, body posture, and interpersonal space may also be a source of misinterpretation of nonverbal cues when assessing CLD individuals (Sattler). These nonverbal cues may be more important indicators than spoken words when working with many CLD children and their families (Marlowe, 2000).

The examiner may identify additional data of particular importance to the understanding of presenting concerns. For example, the interview may highlight the political climate of the CLD child's country of origin, factors that influenced family emigration, trauma incurred, family values and customs, and acculturation history (Gopaul-McNicol & Armour-Thomas, 2002). The examiner should also be aware of differences in acculturation levels between parents and children, which may impact the reason for referral and interview. Additionally, determining a family's attitude toward mental health services and providers may facilitate the interview and assessment processes.

Direct observation is another method of data collection that provides an opportunity to examine an individual's behavior as well as the environmental context of the behavior (Merrell, 2003). Observations of a child also allows the examiner to assess gross motor functioning, including gait and balance, and fine motor functioning, including grasping ability and left-right discrimination (Riccio & Wolfe, 2003). The examiner should compare the identified child's behaviors with those of chil-

dren of similar backgrounds as well as children who are in the majority group (Merrell). Home visits and direct observation are often the most effective manner of gathering information about the functioning of a CLD preschool child and her or his family background (Marlowe, 2000). Home visits, however, may be considered intrusive in some cultures.

Given their significance, examiners must take appropriate steps to maximize the effectiveness of the direct observation and interview processes. Effort on the part of the examiner to communicate warmth as well as to provide information about the duration and scope of the interview may alleviate the anxiety of the individual and family (Nell, 2000). Asking direct questions may be more or less effective than allowing for an open-ended conversation, depending on the cultural background of interview participants (Marlowe). Additionally, learning about the CLD child's culture and language, considering culturally-relevant factors when attempting to establish rapport, avoiding technical jargon, and making an attempt at understanding the cultural perspectives of the child and the family may improve the effectiveness of interviews with CLD children (Sattler, 1998; as cited in Merrell, 2003). Understanding the communication style of the family and the perception of a disability may also facilitate the assessment (Cohen & Spenciner, 1998). The examiner should also make an effort to fully inform the family of the assessment process and the reason for the detailed nature of the interview (Marlowe, 2000). When a family member fully understands the nature of the examination and interview, it is likely that she or he will participate more fully in the process.

Attention, concentration, and orientation. Assessment of attention, concentration, and orientation are basic components of a neuropsychological evaluation. Problems within these domains are often the impetus for a child coming to the attention of a mental health professional. Issues with attention and concentration are symptoms frequently associated with referral for a neuropsychological evaluation (Riccio & Wolfe, 2003). The construct of attention consists of "several different capacities or processes that are related aspects of how the organism becomes receptive to stimuli and how it may begin processing incoming or attended-to excitation" (Lezak, 1995, p. 39). Attention is a prerequisite skill for higher-level cognitive functions. Concentration, a highly related construct, refers to vigilance or the ability to sustain attention over a period of time (Strub & Black, 1993). Before assessing complex functions such as memory, attention and concentration must be evaluated. Orientation refers to an awareness of self in relation to surroundings (Lezak). Relevant areas to assess may include orientation to person, place, and time.

Referral for a neuropsychological evaluation is often made by the school system. A CLD child unfamiliar with the educational system may not speak the mainstream language and may appear to have a deficit in the areas of attention, concentration, or orientation. The CLD child may also process directions in a second language and can appear to exhibit deficits in attention, concentration and orientation. The deficits may be more accurately defined as a period of acculturation to the new environment as well as lack dominant language skills. Anxiety experienced by the

child can impact these domains. A CLD child may also have difficulty with orientation because of a lack of familiarity with her or his adoptive country.

It is important, therefore, to consider carefully culturally-relevant factors when a CLD child presents with deficits in attention, concentration, or orientation. While a number of rating scales exist for the assessment of attention, Barkley (1998) indicates that the best measure of attentional functioning is direct observation. A continuous performance task (CPT) is often used to measure attention (Riccio & Wolfe, 2003). Current CPT's are predominantly administered on a personal computer and may pose an unfair challenge to a CLD child unfamiliar with such devices. Additionally, unforeseen language demands may make it difficult for the CLD child to interpret directions for a CPT. Riccio and Wolfe also note that the most effective assessments of attention, concentration, and orientation involve multi-modal measures including tests presented in visual and auditory domains.

Intelligence. The neuropsychological domain of intelligence and the assessment tools traditionally utilized have been a source of intense social controversy since the early 1900s (Reynolds, 2000). The actual construct of intelligence and the factors of which it is comprised, the predictive utility of intelligence tools, as well as the social implications of intelligence testing such as labeling effects remain discussions ever present in the field. While intelligence will be briefly described in this chapter, a more detailed description of the cognitive assessment of CLD children is provided within this text.

Discussion of the relevance of intellectual assessment with CLD children may engender vehement opposition based on the premise that this population has not been exposed to cultural circumstances similar to those of the white middle class (Reynolds & Kaiser, 2003). According to Nell (2000), formal schooling and familiarity with classroom skills (such as paying attention and following directions) impact significantly upon test performance. Additional issues that have been raised with regard to the assessment of CLD children include the few tests developed for such populations (Cohen & Spenciner, 1998), the possibility that students from CLD backgrounds may have had less exposure to formal testing than other students (Cohen & Spenciner; Nell, 1999, 2000), and the relative importance of speed, a component important in many assessment measures, across cultures (Nell, 1999; Sattler, 1988).

Sattler (1988, 2001) proposed arguments that support intelligence testing with children who are ethnic minorities. These arguments included the usefulness of current levels of ability, access to special programs and services, program evaluation, and identification of unequal opportunities available to different groups. Furthermore, regarding the issue of test bias, it has been suggested "that the hypothesis of cultural bias on tests is not a particularly strong one at present" (Reynolds & Kaiser, 2003, p. 555).

It is recommended that more than one measure be used to assess the intellectual abilities of CLD children (Ochoa, 2003). Additionally, it is cautioned that assessing the intelligence of CLD children in English may not provide valid results. Alternatives to traditional assessment batteries include nonverbal tests that measure "es-

entially the same construct" as general intelligence tests with verbal and nonverbal content (Bracken & Naglieri, 2003, p. 247). Examiners using nonverbal measures of intelligence are cautioned to review the standardization procedures to determine the instrument's appropriateness for the CLD child. When interpreting the results of cognitive assessments with CLD children, it is important that the examiner acknowledge the relevant limitations of the test (Ochoa).

Visuoconstructive skills. Visuoconstructive skills "combine perceptual skill with motor response in the context of a spatial task" (Lacks, 2000, p. 401). The measurement of these skills is an important component of a neuropsychological evaluation, as visuospatial skills involve many brain functions. Measures involved in the assessment of visuoconstructive skills involve timed and untimed tasks that require a child to assemble parts of puzzles, determine the gestalt of figures, and copy designs in a structured or freehand format (Lacks). These skills are most frequently compromised by damage to the brain (Lezak, 1995).

The existence of ethnic differences in visuoconstructive performance has been documented (Mayes, Jahoda, & Neilson, 1988). Rather than being a reflection of neurological deficits, variation in performance may be explained by a difference in subjects' familiarity with these tasks and cultural differences in the interpretation of visual stimuli (Gopaul-McNicol & Armour-Thomas, 2002). In addition, the limited time provided for visual spatial measures is often insufficient for CLD children who may not have an internalized appreciation for working quickly (Gopaul-McNicol & Armour-Thomas; Nell, 2000).

In assessing CLD children's visuoconstructive skills, it is necessary to modify traditional administration procedures, combining a quantitative approach with one that is more qualitative (Gopaul-McNicol & Armour-Thomas, 2002; Nell, 2000). It is important to observe a child's behavior and approach to the visuoconstructive task in order to gain a more comprehensive understanding of CLD children's strategies. Testing limits is especially important when assessing the visuoconstructive functioning of CLD children. Adding time may allow an examiner working with a CLD child to determine whether errors are clinical or cultural in origin (Gopaul-McNicol & Armour-Thomas).

Processing speed. Processing speed is a measure of how quickly simple perceptual or mental operations can be performed (Hedden et al., 2002). Processing speed is sensitive to brain damage, is related to a variety of cognitive skills, and requires children to maintain focused attention and concentration. Studies have found that CLD individuals perform significantly poorer on measures of processing speed than European Americans (Nabors, Evans, & Strickland, 2000; Puente & Ardila, 2000). However, these differences may not be due to neuropsychological differences but may be influenced by cultural factors. Some CLD children may favor thoughtful deliberation over speed, thus negatively affecting their processing speed performance (Nell, 2000; Puente & Ardila, 2000). Lack of experience with performing tasks accurately under a time constraint may also affect the performance of a CLD child.

When assessing the processing speed of a CLD child, it is important to give children a thorough explanation of what is expected of them for processing

speed tasks. The examiner should clarify that the child must work as quickly and accurately as possible. Practice with processing speed tasks may also benefit CLD children if they will be evaluated with traditional measures.

Memory. Memory refers to the encoding, storage, and retrieval of information (Parkin, 2001). Much research in the area of memory focuses on declarative memory, or the learning and recalling of information, objects, and events (Lezak, 1995). Procedural memory refers to the memory of actions such as walking, talking, dressing, and eating (Lezak, 1995). There are several distinct types of memory that have been investigated including short-term memory, working memory, and long-term storage and retrieval skills. Short-term memory involves the apprehension and immediate use of information (Woodcock, 1993). Working memory refers to the process “involved in the temporary maintenance and manipulation of information” (Baddeley, 2002, p. 85). Long-term storage and retrieval consists of the ability to store information in long-term memory and then to retrieve it later through associations (McGrew & Flanagan, 1998; Woodcock, 1993). Distinctions also exist between verbal memory and nonverbal memory. Learning represents a complex array of memory-related tasks. As children experience events in academic and social environments, they rely on all aspects of memory functioning. Neurological disorders may affect a child’s ability to encode, store, and retrieve information needed for learning (Riccio & Wolfe, 2003).

There are specific issues that the examiner needs to consider when assessing a CLD child’s memory functioning and these issues may differ as a function of the specific culture. For example, in the United States, individuals are accustomed to repeating a seven-digit sequence when using the telephone whereas Spanish-speakers tend to cluster numbers by two and three numbers (Ardila et al., 2000). Additional consideration needs to be given to familiarity with the content of specific instruments. For example, list learning tasks often used to assess memory function tend to include culture-specific words. Factors such as lack of familiarity with the testing situation may also impact upon memory functioning in that reduced comfort can be expected to heighten anxiety and potentially decrease the child’s performance.

Research on CLD individuals and working memory suggests that when assessment tasks involve digits (e.g., traditional digit span tests), even with Arabic numbers, which are familiar to many cultures other than mainstream American culture, cultural differences emerge (Trey et al., 2002). Cultural differences on these digit tasks have been suggested to be related to linguistic differences between spoken languages (e.g., length of time it takes to articulate the numeral). Visual spatial measures of working memory have been found to not be as significantly influenced by culture (Trey et al.). Luer et al. (1998) further caution that nonverbal or visual memory span tasks are culturally fair only if the stimuli are difficult or impossible to verbalize or memorize verbally. This again corresponds to the concept that linguistic differences impact time to encode information, which in turn impacts memory span.

Memory is a complex process comprised of numerous subskills that can be assessed by a wide array of tasks. Tests of memory include digit repetition, visual design reproductions, and list learning tasks. Lezak (1995) recommends that an assessment of memory include tasks that measure immediate retention span; short-term retention with interference; learning capacity and retention of newly learned material; and, efficiency of retrieval of recently learned and long-stored information. When assessing children in academic settings, it is more useful that an assessment of memory "includes tasks more similar to everyday tasks and list learning, so that a learning slope can be determined" (Riccio & Wolfe, 2003, p. 311).

Examiners assessing the memory functions of a CLD child must remain aware of the impact of culture and language and take necessary precautions to maximize the utility of their assessments, such as use multiple measures to assess the multiple memory subskills and consider potential limitations when interpreting the results.

Executive functioning. The measurement of executive functioning typically involves a review of higher-order processes, including organization, planning, and problem solving skills (Riccio & Wolfe, 2003). With regard to the assessment of children, Riccio and Wolfe warn that most measures intended for the assessment of children's executive functioning are downward extensions of their adult counterparts. As executive functioning is rooted in areas of the brain that continue to develop throughout adolescence, it is difficult to assess. Riccio and Wolfe suggest that the measurement of executive functioning in children be completed with tasks that "have sufficient items across the continuum of difficulty level in order to measure the developmental trajectory" (p. 311).

Beyond second-language concerns, a child who is unfamiliar with her or his adoptive country's culture may misinterpret a number of tasks that are indicative of higher-level functioning. The CLD child may exhibit culturally-related deficits when expected to demonstrate abstract reasoning skills and interpret proverbs, humor, or other, subtle communication devices. The CLD child may also present organization strategies that differ from what may be expected from native children. As executive functioning represents a developing area of neurological functioning, the CLD child is more likely to exhibit delays unrelated to her or his true functioning in this domain than for neurological functions associated with more stable brain structures.

As the measurement of executive functioning for all children appears to present a number of concerns, the use of the same measures with CLD children is further cautioned. Sbordone (2000) notes that informal assessments of executive functioning can be completed during the interview process by using specific open-ended questions that may reveal deficits in planning, organization, and problem solving. For example, an examiner may ask, "How would you go about putting on a birthday party for a close friend?" to highlight potential concerns with the analysis of the question, the organization of a response, and the evaluation of the outcome (Sbordone, p. 439). In general, an examiner who shares the same background and language with the CLD child is strongly suggested when assessing executive functioning. A more functional evaluation of the CLD child's

higher order reasoning abilities is also suggested. This can be accomplished through an informal and more qualitative assessment of how the CLD child problem-solves and uses her or his planning skills in real, day-to-day situations, rather than of structured tests.

Social-emotional functioning and assessment of behavior and personality.

Behavioral or social-emotional problems in children may result from a myriad of factors. In neuropsychological referrals, these problems may result from hormonal, neurological, or other physiological disturbances, environmental issues, or an interaction between the physical and environmental factors. Additionally, it is not uncommon for neurological conditions to co-exist with behavioral and social-emotional issues. A comprehensive assessment of behavioral functioning includes the integration of multiple assessment methods gathered from multiple sources and across multiple settings (Merrell, 2003; Reid, 1995). Methods can include direct observation, behavior rating scales, and interviews; sources can include the child, family, teachers, and peer group; and, settings can include the home, school, and community (Merrell).

Behavior rating scales are the most common approach to assessing social-emotional and behavioral functioning (Riccio & Wolfe, 2003). These scales can be used to gather information from parents, teachers, and children. According to Reid (1995), the validity of behavior rating scales with CLD children is questionable if the domains assessed are interpreted differently across cultures. Concerns with the use of behavior rating scales with CLD children include the potential for meaning or content changes in translation, the acceptability of behavior in different cultures, and the variability in the interpretation of Likert scales by individuals of different cultural backgrounds. Comparisons of rating scale results for CLD children to the norm group may be misleading due to differences in the interpretation of scale items and behaviors by CLD raters (Reid).

Examiners should carefully assess the manuals of behavior rating scales before deciding to use them with children of diverse backgrounds, as scales may not be normed for use with CLD children or children with neuropsychological conditions (Merrell, 2003). Behavior rating scales, if deemed appropriate, should not replace direct interviews of family members and teachers where relevant.

Within the realm of behavioral and social-emotional difficulties, issues confronted by CLD children require special consideration for their potential role in the reason for referral. According to Sattler (2001), CLD children may be confronted with racism, poverty, concerns related to acculturation (e.g., leaving friends in their country of origin, difficulty with the English language), and other issues. Immigrant families may have had to flee from their country of origin, and the CLD child's reaction to these stressors may lead an examiner to consider an adjustment disorder when appropriate (Gopaul-McNicol & Armour-Thomas, 2002). When evaluating and diagnosing CLD children with problems within the affective or behavioral domain, the examiner must proceed with extreme caution so as to accurately and fairly determine the presence and nature of cultural influences.

IMPLICATIONS FOR FUTURE RESEARCH AND PRACTICE

Specific recommendations have been provided in each domain of functioning to guide the examiner working in a school setting so that she or he will be able to provide a thorough, psychometrically accurate, and ethically sound neuropsychological assessment of a CLD child. Each neuropsychological domain presents with its own particular challenges, but a few general points apply to the assessment process as a whole. The examiner conducting a neuropsychological evaluation of a CLD child is encouraged to be flexible in her or his approach to testing and engage in multimethod, multisource assessments across multiple settings. It is important to examine all neuropsychological assessment manuals to determine whether there is any information regarding the instrument's use with CLD children and to adhere to the exclusionary criteria (Ochoa, Powell, & Robles-Pina, 1996). The development of proper norming methods for CLD children is essential. To obtain valid results, examiners should become familiar with the culture of the CLD child and make an effort to build rapport with the child and her or his family. As with any client, the examiner needs to consult with other professionals, especially when the issue of language is involved. The failure to address CLD children's specific linguistic and cultural backgrounds may result in the underutilization of services, the inaccurate diagnosis of neurological conditions, and the application of inappropriate interventions (Fisher, 2003). Despite advances in the neuropsychological assessment of CLD children, most neuropsychological tests still omit specific data on ethnic minorities and fail to account for the effects of cultural and educational variables (Baron, 2004). The examiner completing a neuropsychological assessment with a CLD child cannot simply note ethnic or cultural differences. She or he "must define, measure, and adjust for racial/cultural group rather than merely assigning an individual to a race/ethnicity group and making a judgment without consideration of other relevant and more pertinent factors" (Baron, p. 23).

Multiple challenges exist in the neuropsychological evaluation of the CLD child. Much of the information that is garnered from the neuropsychological assessment of children is based on medically-oriented models. More research in the area of educationally relevant intervention planning based on neuropsychological information is needed (Riccio & Wolfe, 2003). It is clear that the application of neuropsychological principles in a school setting necessitates not only a great deal of specific training and clinical expertise, but also an awareness of developmental issues (Hale & Fiorello, 2004). When performing a neuropsychological evaluation on a CLD child, cultural and linguistic variables are as critical as developmental issues, especially when the assessment method will be guiding subsequent recommendations and interventions. As Marlowe (2000) notes, "the opportunity to study the interaction of culture and behavior is greater and more critical than ever" (p. 158). The examiner working with the CLD child should strive to engage in best practices when working with this multidimensional, underserved population.

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RESOURCES

- American Academy of Clinical Neuropsychology:
<http://www.theacn.org>
- American Board of Clinical Neuropsychology:
<http://www.theabcn.org>
- American Board of Professional Neuropsychology:
<http://www.abpn.net>
- Division 40 of the American Psychological Association:
<http://www.div40.org/>
- National Association of School Psychologists:
<http://www.nasponline.org>

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