Barriers and Practical Approaches to Neuropsychological Assessment of Spanish Speakers

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Introduction

Cultural understanding and competence is increasingly emerging in psychology due to fast changing demographics. Major problems exist within the specialty of clinical neuropsychology as individuals from diverse backgrounds are increasingly being represented as patients and the science and practice of neuropsychology continues languishing behind.

This chapter will highlight the unique challenges that arise when assessing Hispanics/Latinos, and provide practical resources that could be useful for clinical practice with Spanish speakers across various settings (e.g., pediatric/adult,

neurosurgical/medical, etc.). Information regarding available Spanish tests and the process of both test selection as well as establishing language dominance in bilinguals will be discussed. We also focus on the theoretical and empirical aspects of test interpretation with Hispanics/Latinos, and emphasize recent scientific evidence that highlights the impact of acculturation, linguistic, and sociocultural factors on neuropsychological test performance in Hispanics/Latinos. In addition to these practical considerations, theoretical models of bilingualism are explored, especially as it relates to the acquisition of L1 and L2 during development. Empirical findings from cortical stimulation mapping (CSM) and functional magnetic resonance imaging (fMRI) studies will be highlighted to elucidate discussion on the cerebral representation of bilingualism, which is clinically relevant for neuropsychologists who work in neurosurgical settings.

Hispanics/Latinos: Changing the Scope of Practice?

The Hispanic/Latino population is the largest and fastest-growing ethnic minority group with more than 50 million individuals, accounting for approximately 16.3% of the U.S. population (U.S. Census, 2011). More than 35 million people speak Spanish at home (U.S. Census, 2009). It is expected that Hispanics/Latinos will comprise 29% of the U.S. population by 2050 (Pew Hispanic Research Center, 2008). Not surprisingly, this socio-demographic shift is creating unprecedented demands for culturally competent services in the mental health field; however, there are a shortage of available resources in the specialty of neuropsychology since a majority of professionals report inadequate preparation to work with Hispanics/Latinos due to the cultural complexities involved, or are unable to provide clinical care in Spanish. For example, the numbers of trained neuropsychologists who speak Spanish are sharply underrepresented at all professional

levels (Echemendia, Harris, Congett, Diaz, & Puente, 1997). Indeed, there are only 42 professional members of the Hispanic Neuropsychological Society (HNS) and less than 1% of neuropsychologists are reportedly Spanish speakers (Romero, et al., 2009). A review of the National Academy of Neuropsychology (NAN) member directory reveals that 96 members identify themselves as professionals who can provide clinical services in Spanish. A review of the American Academy Clinical Neuropsychology (AACN) member directory, which is comprised of 767 board-certified neuropsychologists, reveals that only 19 members identify themselves as able to provide clinical services in Spanish. It is unclear whether this is done via psychometric support. However, this phenomenon and linguistic factors represent just one of the many potential barriers in providing competent neuropsychological care, particularly to Hispanics/Latinos. To make matters more complicated, Hispanics/Latinos represent a heterogeneous population with variability in country of origin, sociopolitical and economic status, racial background, language dialect and proficiency (monolingual Spanish speaker, monolingual English speaker, bilingual Spanish/English speaker, multilingual), educational attainment and quality, immigration and acculturation patterns, religion, and other cultural variables, which may uniquely impact observations made during the neuropsychological assessment process. Further, the availability of well-translated and culturally appropriate tests with normative data specific to Hispanic/Latino populations also remains quite limited. This raises alarms about the necessity for neuropsychologists who are a) well trained in the area of multi-cultural neuropsychology; b) can appreciate the spectrum of differences among Hispanic/Latino subgroups; and c) can provide competent services to this underserved Hispanic/Latino community.

Professional Issues in the Assessment of Hispanics/Latinos

Pipeline Problem, Appropriate Training, and Issues related to Competence. As mentioned above, there is a dire shortage of neuropsychologists in the U.S. who can provide clinical services in Spanish to meet patient demands. This is observed across membership of various neuropsychological organizations and is seen at the highest level when considering professionals who have board certification. It is important to consider that several barriers exist at all levels of training and professional development that may account for the limited access of competent neuropsychological services for the Hispanic/Latino community (detailed below). In light of this dilemma, there has been an increase in proactive efforts by national leadership of neuropsychological organizations to cultivate ethnic minority neuropsychologists who are both fluent Spanish speakers and culturally competent at early stages of training since recruitment represents the major barrier for the diversification of neuropsychology. Here we provide obstacles and solutions for the improved recruitment of young ethnic minority students into our field, the so-called "fractured pipeline" approach, based on recent efforts by Mindt (2010), as well as Lechuga & Salinas (2010).

Recruitment/Retention Issues at the High School, Collegiate, and Graduate Levels:

*Lack of exposure to neuropsychology

*Lack of funding mechanisms for extra-curricular activities (summer research programs) and tuition (scholarships for underprivileged students)

*Lack of mentorship/support from professionals who represent diverse groups

*Limited to no diverse faculty; only 4% of college faculty are Hispanic/Latino (National Center for Education Statistics, 2011) and even fewer in graduate programs with neuropsychology tracks

*Limited neuropsychological research focusing on ethnic/diversity issues

*Hispanics/Latinos represent 8.8% of the population who obtained a Bachelor's Degree in Psychology; however, this number reduced to 5.8% at the Doctorate level (National Center for Education Statistics, 2012)

*Hispanic/Latinos represented 7% (179/2650) of students who applied for internships via APPIC matching system in 2010. This percentage has remained stable since 2005 despite the growing need for Hispanic/Latino psychologists.

*Compared to other psychology specialty programs, such as counseling and school psychology, ethnic minorities appear to be disproportionately underrepresented specifically within neuropsychology training programs. All of this data suggests that there are significant educational barriers that exist for Hispanic/Latinos at all levels; however, neuropsychology is a particular specialty that has not seen the same ethnic diversification as other areas of psychology.

Solutions

*Increasing awareness at the high school and collegiate levels by having neuropsychologists present at schools (TOPSS presentations)

*Increasing minority fellowship programs

*Offering free student registration for high school/college students and mentoring at neuropsychological conventions (National Academy of Neuropsychology

sponsored this type of program during the 2008 and 2009 meetings; Diversity Committee initiated project)

*Increase in role models and mentoring programs

*Improving peer mentoring networks

*Including students in governance roles

*Encouraging students from Hispanic/Latino backgrounds or Spanish speakers to join the Hispanic Neuropsychological Society (HNS)

*Offering conferences and continuing education programming that emphasize topics related to Spanish speakers (HNS held a one-day conference prior to the International Neuropsychological Society conference in Acapulco in 2010)

*Offering scholarships or awards for research focusing on Spanish-speaking issues (HNS began a scholarship program in 2012)

Training/Competence Issues

*Little detail is provided in the Houston Conference guidelines (Hannay et al., 1998) about the level of multicultural knowledge and skills required to function as a clinical neuropsychologist, or how this is to be achieved.

*It is unclear to what extent neuropsychology training programs have formal integration of multicultural issues to foster cultural competence in their curricula, didactics, and training.

*There are a limited number of APA-approved neuropsychology internships that have faculty who can provide supervision to Hispanic/Latino trainees who are requested to evaluate Spanish speakers.

*There are even more limited opportunities for post-doctoral neuropsychology training that includes Spanish-speaking faculty and/or provides clinical experience with Hispanic/Latinos. Currently, there are only 12 post-doctoral fellows who are members of HNS. The primary author identified 15 postdoctoral programs from the HNS Training database and Association of Postdoctoral Programs in Clinical Neuropsychology (APPCN) who currently offer this subspecialty training:

Barrow Neurological Institute/Phoenix Children's Hospital;
Harbor-UCLA Medical Center; Children's Hospital Colorado;
Institute of Living/Hartford Hospital;
University of Miami Department of Rehabilitation Medicine;
University of Miami Department of Psychiatry;
Boston Children's Hospital;
University of Michigan Health Systems; Henry Ford Health System;
New York University Comprehensive Epilepsy Center;
The Institute for Rehabilitation and Research; Baylor College of Medicine;
University of Texas/MD Anderson Cancer Center;
Michael E. DeBakey VA Medical Center;
Texas Children's Hospital;
University of North Carolina Wilmington/Private Practice of Antonio Puente

Paucity of Spanish Tests and Normative Issues. Historically it was assumed that if a neuropsychological test had to be administered to a Spanish speaker, one could simply translate the test into Spanish. This was accomplished by doing a uni-directional translation, although this notion was eventually replaced by the idea that fidelity would be more likely achieved with a back-translation. However, the concept of item or concept equivalence, as espoused by Helms (1992), is more recent and much more complicated.

When the third author of this chapter worked as project director for the Spanish translation and adaptation of the Wechsler Intelligence Scale for Children, 4th Edition, for then Psychological Corporation, the amount of time, energy and personnel required to achieve cognitive equivalence across all items of the test was unexpected. To achieve this fidelity, an initial and core group of individuals representing the major Hispanic/Latino subgroups living in the U.S. were assembled. They worked, in consultation with an external group of advisors, on achieving the goal of equivalence between the English and Spanish versions of the WISC IV. The following were examples of the difficulties in achieving this goal:

1. The use of highly cultural items was avoided if they could not be understood across all Hispanic subgroups (e.g., picture of snow).
2. Digits in English are almost exclusively single syllable whereas in Spanish they are often more than one syllable.
3. It was impossible to develop proverbs that each Hispanic subgroup could agree would not be biased towards one or more subgroups.
4. In math, monetary differences across countries were hard to rectify.

5. Even with simple drawings of children, the types of clothing, skin color and hair type and color were difficult items to make generic.

Normative issues for this project were equally daunting. The expense required to obtain geographically distributed cells of participants for each of the Spanish subgroups residing in the U.S. was extremely difficult. Sometimes it was almost impossible to find a child of a certain age, sex, parental educational attainment and of a specific Hispanic subgroup living in certain regions of the United States.

Regrettably, most tests that are viable in Spanish are translated, often not back-translated and there are few that have Spanish-speaking norms. The ones that are available, such as Ardila et al. (1994) or Ponton et al. (1996), have limited geographic representation and are of one Hispanic/Latino group only. In the former, the group was Colombians residing in Colombia and the latter primarily Mexicans residing in Los Angeles. In both cases, the tests, though useful in their own right, do not meet the criteria outlined in the current or prior Standards for Educational and Psychological Tests.

Ojeda and Puente (2010) have previously reported that there are close to 3500 tests available in English. Approximately 555 of these are available in Spanish. Of those, 216 or 39% are used by neuropsychologists to assess Spanish speakers. Of these, twenty-five are frequently used. Five of the cognitive tests currently available for the neuropsychological assessment of Spanish speakers meet the Standards for Educational and Psychological tests (e.g., Bateria III Woodcock Muñoz; Color Trails Test; Wechsler Adult Intelligence Scale, 3rd Edition; WISC-IV; Peabody Picture Vocabulary Test). That is, these measures are available in Spanish, there are Hispanic norms for the U.S.

population, there are non-U.S. Hispanic specific normative data, and there is a test manual in Spanish that includes standardized instructions.

Establishing Language Dominance

Nearly 12% of people living in the U.S. aged 5 and over speak Spanish at home (U.S. Census, 2009) with varying degrees of English and/or Spanish linguistic fluency (including "Spanglish" in which a person utilizes borrowing and code-switching). This surge in linguistic diversity means that neuropsychologists are frequently called upon to evaluate bilingual Spanish-English patients, which poses complex challenges. Although assessment of language function is typically an essential component of any neuropsychological evaluation, it is particularly essential to understand the degree of proficiency and acquisition of two languages (types of bilinguals will be explained later in this chapter) as these factors may influence the development of associated cognitive processes, academic skills, as well as brain structure and function (Manuel Dupont, Ardila, Rosselli, & Puente, 1992; Rivera Mindt, 2008). However, many clinicians struggle with the challenges of how to a) approach an evaluation with a bilingual patient, b) determine whether a patient's linguistic background may require test administration in Spanish and/or English, and c) determine when a patient should be referred to another examiner who is bilingual.

Consistent with recommendations offered by the NAN and HNS policy paper on the evaluation of Spanish speakers (Judd et al., 2009), determining the best language for the child, and therefore, assessment of language proficiency is to be conducted at the outset of the evaluation. Although Spanish may be the primary language at home, there will be varying levels of an individual's proficiency that can impact performance on

neuropsychological test measures. As such, identifying one's proficiency helps to establish the most appropriate language for the evaluation. Assessing language preference and dominance should be conducted both informally through interview questions that provide information about 1) the frequency and context of language use (e.g., he/she speaks in Spanish with friends in neighborhood but prefers to speak English with school friends or co-workers); 2) the extent to which languages are blended ("Spanglish"); 3) the level of receptive and expressive language skills; 4) educational quality received (i.e., whether the child or adult received English as a Second Language classes; formal education in English or Spanish) as well as formally through standardized measures, unless through informal measures the "bilingual" patient is not bilingual (i.e. the child speaks only 1-2 words in Spanish; he/she is unable to follow basic commands or understand simple conversation in either English or Spanish). The informal method assists with assessing "surface fluency" or Basic Interpersonal Communication Skills (BICS) while the formal method assists with assessing Cognitive Academic Language Proficiency (CALP) (Cummins, 1999). This is particularly important as Hispanic/Latino children are often mis-identified or even mis-assessed because they have stronger conversational skills in English during social situations than they have cognitive-academic language skills, particularly in context-reduced settings such as the neuropsychological testing environment.

Use of Interpreters. It is reasonable to assume that most Spanish speaking or bilingual patients will often present to professionals who need to use interpreters. In those circumstances, we strongly recommend seeking referrals to a qualified bilingual colleague in the local area first. If this is not feasible, it is paramount that

neuropsychologists utilize professionals who are adequately trained and have appropriate certifications from regulatory bodies that maintain ethical regulations. Professional interpreters who have experience and familiarity with neuropsychological evaluations are ideal, and family members should be avoided. Neuropsychologists may need to gain informal and formal training in the use of interpreters, and should specifically document the use of an interpreter or other personnel (e.g., Spanish speaking psychometrist) and translations used (NAN/HNS paper, Judd et al., 2009).

Pediatric Issues. Bilingual children are at-risk of being mis-identified with language disorders and/or learning disabilities in one of two ways. First, they are over-identified for special education because their English is not as strong as their peers and impacts their academic progress. Second, they are under-identified for special education as they are thought to be struggling with bilingualism rather than a true language disorder. Therefore, assessment of proficiency and skills in both languages is necessary in order to differentiate those who are struggling with bilingual acquisition of a second language from those who have a language disorder. Generally, a language disorder is diagnosed when significant difficulties are seen in both languages. A clear pattern of dominance may not yet be established for these individuals. Additionally, bilingual children with language impairment are similar in deficit patterns and acquisition of language as monolingual children with language impairment (Genesee, Paradis & Crago, 2006).

Adult Issues. The later years pose a problem in that bilingualism is lost in the order that the languages were obtained. Specifically, with the development of mild cognitive impairment and subsequently dementia, the loss of the second language occurs

before the loss of the first language (Acevedo & Lowenstein, 2007). Thus, an individual whose mother tongue or native language is Spanish first and when English is acquired as a second language, the loss of linguistic ability is going to affect English first and Spanish second. Hence, assessment of both languages, even with simple tests likes phonetic or semantic fluency may prove to be an early window into the development of cognitive impairment. In this case the administration of both phonetic (F-A-S in English; P-M-R in Spanish) and semantic fluency might be useful, especially if presented in a counter-balanced fashion such as English-Spanish, Spanish-English, and English-Spanish. Scores could then be compared with both tests between languages as well as between trials, phonetic versus semantic, and between languages.

To date there appears no clear and easily administered tests of bilingual abilities that have equivalent versions in Spanish and English. One possibility is to administer relatively similar tests such as the Woodcock-Johnson-III and the Bateria III Woodcock-Muñoz (Spanish version of WJ-III). Other tests might serve of value as well such as the WASI, WRAT, or the Nelson-Reedy. It is of value to note that some of these tests, such as the Spanish versions of the Wechsler, are extremely difficult to purchase in the United States and, in some cases, copyright limitations prevent other countries to market these products in the U.S.

Regardless, it is of value to determine two major issues when addressing linguistic concerns in the neuropsychological assessment of a Spanish-speaking adult. One, determine language dominance. This could be done clinically by asking:

1. Country of origin
2. Initial language exposure

3. Language spoken at home, work and in social situations
4. Asking the individual their preference
5. Determining if there is a preference for a specific language for a specific circumstance (e.g., Spanish for social conversation; English for technical ones)
6. Asking questions in both languages and rate the speed, length and quality of the response
7. Language used in school
8. Type of music listened to and/or books read

The second issue is making sure that if a cognitive impairment is due to dementia, head injury, or related problems (e.g., cerebrovascular) the possibility of language limitations in the acquired language may mask problems with the depth of the knowledge of that language. Thus, careful understanding of the history should be considered in interpreting the linguistic differences noted on tests as being ascribed to simple knowledge differences and/or the development of a cognitive syndrome affecting linguistic abilities. If so, a faster and more efficient window to early deficits (especially in dementia) more likely will surface by examining the acquired rather than the original language.

Test Selection with Spanish speaking or bilingual children and adults: *Which language should be used for the evaluation?* The referral question will often times dictate the language(s) of the evaluation, as will test availability. Here are some real-world scenarios with reasonable decisions provided:

1) “Does the bilingual child have a language disorder?” This evaluation should ideally be conducted in both English and Spanish.

2) “How will this child perform in a mainstream classroom?” This evaluation should ideally be conducted in English if this is the language where his competence will be evaluated.

3) “What is the impact of this child’s neurological condition to his/her cognitive functioning?” This evaluation should ideally be conducted in the language(s) the child prefers and based on proficiency from informal and formal assessment measures.

4) “Will the child benefit from rehabilitation services upon return to his/her native country?” This evaluation should ideally be conducted in Spanish if this is the language in which therapy services will be conducted.

5) “Does this adult have a neuropsychological disorder such as dementia? Simply using tests in Spanish should address the issue in question, particularly if the patient was born and educated outside of the U.S.

6) “Is the person capable of functioning in a community dwelling in the U.S.?” In this case the possibility exists that tests should be administered in English. Further, administering a test inquiring about their knowledge of U.S. money, public transportation

and even the organizational systems (such as educational) in the U.S. is much more important than in his/her country of origin.

As part of the clinical evaluation, it is important that the examiner documents his/her rationale for determining which language was used during test administration and any breaks in standardization to account for these decisions. As mentioned earlier in the chapter, assessment of language proficiency in both languages may be needed in the case of a "bilingual" patient. The following is an example statement that can be included in a pediatric neuropsychological report prior to the test interpretation section:

> "It should be noted that XX' primary language at home is Spanish. As a result, the assessment was conducted in Spanish and English with a bilingual/bicultural examiner. XX stated his preference to be in Spanish. Evaluation of his language proficiency (discussed in the test results section) was conducted prior to other assessment measures in order to establish the most appropriate language for the evaluation. Results showed dominance in his Spanish language abilities, although he was found to have difficulties in both languages on academic tasks. His single-word naming ability was noted to be significantly stronger in Spanish. Given these findings and his stated preference for Spanish, the assessment of his abilities was conducted primarily in Spanish with deviations in standardization for repetition of instructions in both languages whenever needed. Answers were accepted in either language."

Once the language(s) of the evaluation is determined, then examiners are faced with making clinical decisions about which tests to administer to the patient. As was highlighted earlier in this chapter, neuropsychologists who want to serve

Hispanics/Latinos are at a significant disadvantage regarding the repertoire of Spanish assessment measures available which meet the Standards for Educational and Psychological Tests. Here we provide a list of available tests in Spanish that could be used to comprise a test battery for children at different ages, which is commonly used by the first two authors (Table 1). It is by no means meant to be an exhaustive list, but rather a sample list of possible tests. Recommended norms to be used for specific tests and/or references are provided in parentheses below. Notably, clinicians should be knowledgeable of the normative group and psychometric information for a measure in order to make more accurate interpretations about neuropsychological functioning (e.g., normative data was collected on bilingual versus monolingual English/Spanish subjects).

Table 1. Pediatric Neuropsychology Spanish Test Selection Form

Parent Rating Scales/Questionnaires

[ ] Bilingual Acculturation Scale (BAS) for parents

[ ] Marin & Marin Acculturation Scale for parents

[ ] Child Behavioral Checklist (CBCL) Multicultural Supplement

[ ] Behavioral Assessment Scales for Children-II: 2-5, 6-11, & 12-18 (Translation; English norms)

[ ] Adaptive Behavioral Assessment System-II: 0-5, 5-21 (Translation; English norms)

[ ] Vineland Adaptive Behavior Scales – II (Translation, English norms)

[ ] Children's Depression Inventory-2 Spanish, Parent (CDI-II; 7-17; Translation; English norms)

Child Emotional/Behavior Questionnaires

[ ] 6-18 Revised Children's Manifest Anxiety Scales-II (Spanish Translation; English norms)

[ ] BASC-2 Self Report (Translation; English norms)

0- 4 yo Screening

[ ] Birth+ Preschool Language Scales-V (U.S. bilingual)

[ ] 2:6+ Differential Ability Scales-II (DAS-II; U.S. monolingual Spanish)

[ ] 2+ Woodcock-Muñoz Language Survey – Revised (U.S. bilingual)

[ ] 3-4 Comprehensive Evaluation of Language Fundamentals,4th Edition, Preschool (CELF-IV)

[ ] 2+ Beery Developmental Tests, 6th Ed., Visual-Motor Integration

[ ] 3+Wide Range Assessment of Visual Motor Abilities, Pegs subtest (WRAVMA; English norms)

[ ] 3 Bracken Basic Concept Scale, Third Edition Spanish (BBCS, III; Translation; English norms)

[ ] 4+Kiddie Continuous Performance Test (Kiddie CPT-II; English norms)

5-16yo Battery

[ ] 5-6:11 Differential Ability Scales-II (U.S. monolingual Spanish)

[ ] 6+ WISC-IV Spanish

[ ] 5+ Woodcock-Muñoz Language Survey – Revised (U.S. bilingual)

[ ] 6-11 California Verbal Learning Test-Children (CVLT-C; Rosselli, Ardila, Bateman, & Guzman, 2001; non-U.S. monolingual Spanish)

[ ] 5+ Boston Naming Test (BNT; Ardila & Rosselli, 1994)

[ ] 4-12 Expressive and Receptive One-Word Picture Vocabulary Test, Spanish (Bilingual norms)

[ ] 2+ Beery Developmental Tests, 6th Ed.,Visual-Motor Integration

[ ] 5+ Grooved Pegboard (GPB; Rosselli et al., 2001; monolingual Spanish 6-11yo/English norms)

[ ] 5+ CELF-4 Spanish 5-8, 9-21 version

[ ] 6+ Verbal Fluency (Ardila, Rosselli, & Puente, 1994; NEUROPSI norms)

[ ] 5-12 Wisconsin Card Sorting Test (WCST; Ardila & Rosselli, 1994)

[ ] 7+ Rey-O Copy; 10+ Copy/Immediate/Delay/Recognition (Ardila & Rosselli, 1994; NEUROPSI)

[ ] 5+ Kiddie Continous Performance Test (English norms)

[ ] 6+ Connor's Continuous Performance Test-2 (CPT-II; English norms)

[ ] 7-13 Trail Making Test Parts A & B Child Version (TMT; English norms)

[ ] 14+ TMT A & B Adult Version (English Adolescent norms)

[ ] 7+ Tower of London, Drexel Version (TOL-DX; English norms)

[ ] 5+ Test of Visual Perceptual Skills-III Spatial Rel./Fig. Ground (TVPS-III; English norms)

[ ] 5+ Bateria Woodock-Muñoz Pruebas de Aprovechamiento/Pruebas de Habilidad Cognitiva-III

We also offer a suggested list of tests below that may be used to assess Spanish speaking adults, which is currently being implemented by the third author (Table 2). Notably, it is typical that referral questions are not well presented. As a consequence, questions of comparison samples from the country of origin and to the country of residence may be in order. Thus, the administration of multiple "equivalent" tests available in Spanish and English, in counter-balanced order, may help address a variety of questions simultaneously.

Table 2. Adult Neuropsychology Spanish Test Selection Form

[ ] "A" Cancellation Test

[ ] Bateria 3

[ ] Beck Depression Inventory- II

[ ] Calculation Ability (Ardila, Rosselli & Puente, 1994)

[ ] Digit Span (WISC-IV; WAIS-III; NEUROPSI)

[ ] Draw a Cube

[ ] Phonemic Fluency, F-A-S

[ ] Frontal Systems Behavior Scale (FrSBe)

[ ] Min-Mental Status Exam

[ ] MMPI-2

[ ] NEUROPSI/NEUROPSI-2

[ ] NEUROPSI- Attention

[ ] Peabody Picture Vocabulary Test

[ ] Test of Memory Malingering

[ ] Spanish Language: Phonemic Fluency, Repetition, Reading, Writing, Grammar (Ardila, Rosselli & Puente, 1994)

[ ] Stroop Test

[ ] WAIS- III

[ ] Wood Munoz Language Survey- Revised

[ ] Word List

Examining Empirical Evidence through a Multi-Cultural Lens

The idea that culture may modulate underlying cognitive mechanisms is not new- the development of several thousand languages across the globe exemplifies its significant role. Nevertheless, the concept that cultural variables may impact test performance in Hispanics/Latinos has just gained momentum over recent decades. This is surprising since neuropsychologists do not interpret behavior or test data in a vacuum, but within the context of their patient's lives, medical histories, and so on. The same approach should be applied in the context of individuals from a non-majority culture (i.e., Hispanic/Latinos). Notably, a patient's cultural identity and attitudes (including family values) may play a significant role in his/her linguistic proficiency and preference. Beyond this, his/her cultural background may impact occupational or socioeconomic status, years of education, and the rationale behind migrational patterns, which may indirectly impact cognitive and/or psychological functioning. Country of origin often

times dictates geographical residence in the U.S. for immigrants, and this holds true for Hispanics/Latinos (i.e., large Puerto Rican population in Orlando, large Cuban population in Miami, large Mexican population in Houston and Los Angeles). These factors should be considered during the evaluation process as variability in geographical residence among Hispanic subgroups may influence their degree of acculturation and assimilation to U.S. culture, which have been identified as impacting neuropsychological performance (detailed below). Unfortunately, test norms do not typically account for these differences. Country of origin and U.S. residence may also impact educational quality received, an area that is often overlooked in the neuropsychological literature. Hispanics/Latinos as a broad group also have less access to healthcare insurance in the U.S. (particularly those from Mexico), which may have a direct impact on cognitive functions. Other cultural variables that dictate perceptions of healthcare professionals and disease may impact medical compliance and coping. Hence, assessing Hispanic/Latino patients adds a great deal of complexity to the evaluation process beyond linguistic factors. In the following section, we will highlight cultural variables that are particularly important to consider when assessing Hispanics/Latinos based on empirical findings.

Impact of education and acculturation on neuropsychological test performance in Hispanics/Latinos. In the 1994 book by Ardila, Rosselli and Puente, limited norms were provided on a wide range of neuropsychological tests that had been translated and adapted into Spanish. These tests were given to several hundred individuals that were stratified according to age and education. The norms indicate that individuals with no or very low levels of education perform roughly similarly to individuals with higher levels (e.g., high school) of education and verifiable brain dysfunction. In essence, education

appears to partially mediate neuropsychological performance on the tests chosen. These tests were derived from a variety of sources but a substantial number of them represent tests used both in Russia (from Luria's lab) and from commonly used tests in the U.S. (see Camara, Nathan & Puente, 2000).

Subsequent research by Ardila, Rosselli and colleagues (notably Ostrosky and Matute from Mexico) provide increasing evidence that illiteracy affects brain functioning in an inverse way. That is, the less education one has the more impaired he or she appears on neuropsychological tests. Of interest might be the more recent research by them (Ardila et al, 2010; Rosselli & Ardila, 2003) that dispels the long-held assumption that if these deficits were to exist they would be limited to tests heavily loaded on verbal material. Such research supports the hypothesis that lack of educational attainment is highly correlated with impaired functioning in both verbal and non-verbal neuropsychological tests.

Much less understood is the potential role of acculturation in neuropsychological performance of Spanish speakers. In the general clinical literature, there is well established evidence that acculturation plays a significant role in overall adaptation of individuals, the likelihood of development of mental illness and responsiveness to mental health interventions (see the work of LaFromboise, Albright, & Harris, 2010, among others). This research has been specifically demonstrated with subgroups of Hispanics/Latinos (Padilla, 1992). However, the role of acculturation on measures of neuropsychological functioning has yet to be studied.

Salazar and Puente (unpublished manuscript) found that on the Beta III, a non-verbal test of intelligence developed almost a century ago, that acculturation plays a

significant role in mediating the results. The population was limited to first generation Spanish-speaking individuals residing in the U.S. that were recruited from a multi-disciplinary health clinic but not mental health or neuropsychologically impaired individuals. These preliminary findings combined with existing research of general clinical populations provided support for the idea that acculturation may, like education, mediate level of neuropsychological performance.

Puente and Perez Garcia (1998) have suggested that, at least on the surface, neuropsychological tests are heavily culturally based. This idea is shared by others including Nell (1999) who in his seminal work on cultural neuropsychology suggested the same with his extensive work with indigenous populations.

Though it is too early to determine whether acculturation has as large an impact as education, the role of acculturation needs further study and should be considered, at least for now, as a variable that should be factored in from a clinical perspective as a means of reducing error in neuropsychological measures. The most recent version of the Standards for Educational and Psychological Tests (in press) supports the notion that both linguistic *and* cultural variables play a role in reducing measurement error.

Case Example: Boy with Neonatal Seizures and Previous Diagnoses of Asperger's Disorder and Attention Deficit Hyperactivity Disorder

"Luis" presented with significant difficulties in emotional/behavioral regulation, distractibility, language functions, and academic abilities. Luis had a history of neonatal seizures. MRI of the brain and EEG were described as normal. He was not treated with long-term anticonvulsant therapy and seizures have not recurred since infancy. A more recent EEG in the past year was normal, as was other genetic testing including possible

Fragile X syndrome. Luis has a history of global developmental delays and was recently diagnosed with Asperger's Disorder and ADHD. He lived with his parents and sibling in a predominantly Spanish-speaking city in southwestern U.S. and Spanish is the primary language spoken at home. He had informal exposure to English as a young child and was considered a simultaneous bilingual. The family was encapsulated in the Latino culture due to their geographical location, and they were of lower middle class. Given the clinicians' knowledge that multiple generations could be involved in childcare in Hispanic/Latino families, she inquired about extended family. Indeed, Luis often visited and stayed overnight with his grandparents who were from Mexico; therefore, they served as cross-informants during the clinical interview. Their observations helped with diagnostic clarification. For example, Luis was described as being fearful of being alone in his home. He reportedly clung to his mother and still slept with his parents. Although this represented a deviation from the norm for U.S. culture since Luis was 7 years old, this was not a significant concern to his parents. He was also described as an independent boy without any overt fearful behaviors noted at his grandparents' home, indicating that his behavior was situationally dependent (e.g., slept alone and he did not exhibit any food or sensory aversions with them; these behaviors were previous factors that contributed to an Asperger's diagnosis) .

Academically, Luis was enrolled in 1st grade and was in special education placement. He received speech therapy in English. Prior to this evaluation, it was recommended that he be retained. Informal language assessment included assessing Luis' behaviors at home: he watched television in both languages, spoke only Spanish to parents and grandparents, and spoke in both languages to his sister and peers. Formal

assessment was conducted with the Woodcock Muñoz Language Survey, Revised (WMLS-R), which revealed him to be a predominantly Spanish speaker (Table 3).

Table 3. Woodcock-Munoz Language Survey, Revised (WMLS-R)

	English	Spanish
Subtest	Standard Score	Standard Score
Picture Vocabulary	62	94
Verbal Analogies	91	87
Letter-Word Identification	36	58
Dictation	51	54

Composite Scores	English Standard Score	English CALP Level/Label	Spanish Standard Score	Spanish CALP Level/Label
Oral Language	74	3/limited	89	3.5/limited to fluent
Reading-Writing	28	1/negligible	46	1/negligible
Broad Ability	38	1/negligible	56	1/negligible
Writing	51	1/negligible	54	1/negligible

Luis previously underwent a bilingual psychoeducational assessment, and English-only neuropsychological evaluation; however, both emphasized nonverbal testing. Notably, the second practitioner reported that Luis was more proficient in Spanish, but understood and spoke English. A telephone conversation with the neuropsychologist revealed that Luis had stated a preference for English, and that an interpreter assisted with the completion of parental questionnaires in English. Based on

this latter evaluation, Luis was diagnosed with Asperger's disorder and Borderline Intellectual Functioning.

The test battery for Luis during the current evaluation included the following: WISC-IV Spanish; CPT-II; ToL-DX; BRIEF, Teacher Version; WMLS-R in English and Spanish; Receptive One-Word Picture Vocabulary Test, Spanish-Bilingual Edition; Wide Range Assessment of Memory and Learning-2nd Edition (Verbal Learning, Design Memory, Picture Memory); Grooved Pegboard, Bracken Basic Concept Scale, Third Edition, English and Spanish versions; Vineland-II Survey, Spanish version; BASC-2, Parent and Teacher Versions. Other tests such as the Reynolds Intellectual Assessment Scales; WJ-III in English and the Bateria in Spanish; Peabody Picture Vocabulary Test-4; Beery Visual Motor Integration; Test of Nonverbal Intelligence 4th Edition; portions of the NEPSY-II (Animal Sorting; Comprehension of Instructions; Word Generation; Narrative Memory; Affect Recognition; Theory of Mind); and the Childhood Autism Rating Scale in English had previously been administered.

When a child has a non-English dominant profile (as was the case for Luis) the neuropsychologist must decide how much of the remainder of testing will be based on nonverbal tests versus verbal tests. For Luis, instructions were often provided in both languages to increase comprehension. With the exception of language proficiency measures designed to look at each language objectively, other testing may be scored qualitatively or with testing of the limits. That is, if the child produces the correct answer on a question regardless of what language they provide it (e.g., Spanish response to question in English), it is considered correct. In other words, they have mastery of that concept. As discussed elsewhere in this chapter, academic testing is always conducted at

least in English in order to assess what the child has been able to learn in their English-only classroom. Additionally, at least one verbal memory test is usually given in order to assess new learning in English. Tables 4 and 5 highlight key findings.

Table 4. IQ Testing

WISC-IV English 2012	
Verbal Comprehension	73
Perceptual Reasoning	73
Working Memory	56
Processing Speed	62
Full Scale IQ	60
General Abilities Index	70
RIAS 2011	85
TONI-4	Reported to be invalid

Table 5. Language Testing

ROWPVT-SBE 2012	86
WMLS-R 2012	
Picture Vocabulary Spanish	94
Picture Vocabulary English	62
PPVT-4 2011	62
EVT-II 2011	58

Luis' current neuropsychological profile was notable for below average (borderline IQ) cognitive abilities with significant deficits in several aspects of language, attention/executive functioning, and adaptive functioning. Assessment of Luis's language functions revealed stronger Spanish language skills, including average oral language skills. However, he was observed to have difficulties in both languages, especially with

increased abstraction. His spontaneous speech across languages was remarkable for misarticulation errors, long latencies in his responding, as well as immature use of vocabulary and grammar. Moreover, Luis appeared to have better social language as opposed to cognitive/academic language in English. Taken together, these findings reflected a global language deficit rather than a problem with bilingual acquisition of language.

Luis' memory functioning was consistent with his cognitive abilities and somewhat variable. His ability to learn a list of words across four learning trials was in the mildly below average range. He struggled to recall the words after an approximately 15-minute delay as well as discriminate words from non-list words on a recognition task. He also struggled to recall designs, but was relatively able to encode and recall picture scenes. His performance on a task of picture scenes was thought to be mildly elevated due to impulsivity. Given Luis' difficulties with language, the story memory subtest was not administered. However, the list memory subtest with its English norms provided a basis for understanding how he may learn information in an English-only classroom. Based on his performance, we were able to see that he benefited from practice and repetition, but difficulties with attention made it difficult for him to encode and subsequently retrieve information without becoming confused by additional (non-target) items.

With regard to differential diagnosis, behavioral observations and test findings were suggestive of inattention and impulsivity; however, these problems were not described as being clinically elevated in home or school settings. As such, while his difficulties were consistent with a child who may have ADHD, they did not rise to the

level to warrant a diagnosis. Similarly, Luis was described as displaying anxiety in the home setting and had a history of separation anxiety. Observations and report by his parents and grandparents revealed that these anxious symptoms only occur around his parents. As such, further monitoring was recommended, but an anxiety diagnosis was not warranted. Language was most heavily emphasized as part of this neuropsychological interpretation as the misdiagnosis of Asperger's disorder was thought to be associated with incomplete assessment in the child's dominant language during previous evaluations. However, cultural factors such as role of multi-generational caregivers and their differing observation were also considered during diagnostic impressions. Overall, Luis was a child with a Mixed Receptive-Expressive Language Disorder with borderline cognitive abilities. He also had a previous diagnosis of encephalopathy secondary to neonatal seizures.

Feedback was provided to the parents and grandparents in Spanish. Additionally, the complete report was translated into Spanish for the family. Recommendations to Hispanic/Latino families should include consideration of language, culture, and family dynamics. For Luis, these recommendations included services and instruction under English Language Learners, multi-modal learning environment, and behavior modification and expectations for consistency across care settings. As will be discussed below, bilingual speech/language therapy was recommended. However, because Luis was an emerging English speaker, he was thought to also benefit from increased emphasis in his English language learning.

Theoretical Models of Bilingual Language Development. Spanish is the most frequently spoken non-English language in the U.S., although the majority of

Hispanics/Latinos identify themselves as speaking English "very well" (U.S. Census, 2009), with varying degrees of bilingualism. How do these individuals speak and comprehend two languages without mixing them, code switch, or even simultaneously translate one language into another during a conversation? (see Paradis neurofunctional model, 2004; Dijkstra & Van Heuven bilingual interactive activation model, 2002; Grosjean language modes model, 1998; Green's inhibitory control model, 1998). Bilinguals experience many cognitive and social advantages, and are the majority in many regions of the world, yet exploration of this topic has lagged behind in the U.S. Investigations focusing on language functioning in bilinguals have increased given the growing interest in the bilingual Hispanic/Latino population in the U.S., particularly children, and there is curiosity as to how these phenomena may impact other cognitive domains, such as executive functions and academic skills such as reading.

There are still many unknowns about the neural mechanisms of learning two (or more) languages, how to provide therapeutic services to bilingual children, and whether special considerations need to be implemented in medical settings when working with bilinguals who present with neurological disorders. Fortunately, the fast-growing population of Hispanics/Latinos and Spanish speakers has led to a forcing function in which professionals have had to tackle these complex questions. In geographical locations such as Orlando, Florida, which has a large bilingual Puerto Rican population, approximately one-third of residents aged 5 and over speak a language other than English at home (U.S. Census, 2009). Therefore, it is imperative for neuropsychologists (especially those with a specialty focus on pediatrics) to be knowledgeable about the theories of language development for bilinguals. A longstanding model has been the

Unitary Language System Hypothesis (Volterra & Taeschner, 1978) which postulated that children develop a single language with grammatical rules first but then differentiates into two vocabularies. This theory would therefore assume that bilinguals acquire language differently than monolingual individuals. Alternatively, the Dual Language System Hypothesis (Genesee, 1989) assumes two linguistic systems are established. The latter of these appears to be more supported by the scientific evidence, especially that of simultaneous bilingual acquisition.

When examining bilingual language development, it is important to consider that there are three types of bilinguals depending on method of language acquisition – simultaneous, sequential/successive, and circumstantial (Mushi, 2002). Circumstantial bilinguals are those who learn a second language in passing or as a means of "getting by," such as tourists or those living in regions where other languages are more common. For the purposes of discussing language acquisition in children, this section will focus primarily on simultaneous and sequential/successive bilinguals.

Simultaneous acquisition of English and Spanish does not differ from single-language acquisition (Krashen, 1982). In fact, evidence suggests similarities in acquisition of initial language milestones (i.e. babbling and first words) and the development of grammar after the age of 2 (Genesee, Paradis & Crago, 2006). Although some have said that young children may be 4-5 months behind in terms of expressive language development until they enter school (Hamayan & Damico, 1991); this no longer seems to be the case. Additionally, no differences in size of vocabulary were found when total language acquired as opposed to a single language was examined (Hoff et al., 2011; Pearson, 1998). Other researchers have examined the stages of language development in

children and have found that bilingual children pass through the same stage sequence at approximately the same age as their monolingual peers (Genesee, Paradis & Crago, 2006; Paradis & Genesee, 1997; Meisel, 1994). Within the context of autism spectrum disorders, Hambly & Fombonne (2012) found no differences in bilingual versus monolingual exposure on delays in language development. Similarities in development have even been observed in children as young as newborns. A recent study examining preference and discrimination of languages for bilingual (mothers spoke both languages during pregnancy) versus monolingual (mothers spoke only one language in pregnancy) newborns found that the same mechanisms supporting monolingual acquisition of language were available to support bilingual acquisition at birth (Byers-Heinlein, Burns, Werker, 2010).

Sequential/successive bilinguals include a large number of the bilinguals that are referred for neuropsychological evaluation (typically those who acquire L1 during infancy, and then L2 after age 3 when they transition to preschool); therefore, understanding of this acquisition process is essential for accurate case conceptualization and generation of treatment recommendations. These individuals began learning a single language prior to exposure to a second language. The first language learned, which is typical the dominant language is considered L1 whereas the non-dominant language is L2. It is thought that the age of when L2 exposure begins and the extent of L2 exposure will impact the child's ability to fully acquire that language. This will be dependent of the family's makeup including parent's knowledge of English, older siblings, and community exposure and support for L2 (e.g. church, neighborhood). For some, L2 may become their dominant language. For example, children who live in Spanish-speaking homes (L1), but

are exposed to English-only education (L2), may become more dominant in English and this may become their language of preference (L1). As a child's L2 becomes more dominant, there may be L1 attrition or "language loss" [please see Artiola (2008) for a more detailed discussion on this topic]. Immigrant children will typically fall into the sequential/successive bilingual group. For these children, it is thought that they will often acquire peer-appropriate conversation within 2 years (BICS), but can take 5-10 years to catch up academically (CALP; Collier, 1987; Cummins, 1984; 1999; French & Llorente, 2008). This may lead educators and examiners to think they are more proficient (i.e. at the level necessary for assessment) than they may truly be.

A Window into the Bilingual Brain: Understanding emerging evidence from aphasic patients; cortical stimulation mapping and fMRI that provide neural underpinnings to bilingualism theoretical models. Early case studies emphasizing the dissociation between subcomponents of languages in bilingual aphasics (i.e., selective aphasia or selective recovery patterns observed in one language, especially in patients with sequential bilingualism) have led to a fascinating and controversial scientific debate regarding cerebral representation in the bilingual brain. The central questions have focused on whether there is recruitment of separate brain regions in bilinguals to help explain the potential functional separation of lexical organization and word retrieval (Paradis, 2004) or whether a control mechanism in the brain exists that enables a particular language to be accessible, which enables the so-called "code-switching" phenomenon (Green, 1998). In other words, does bilingualism represent a unique window of opportunity to better understand brain plasticity, and do structural and/or functional differences exist based on variations in people's language acquisition? Many questions

remain, and several factors such as age of second language acquisition; level of L2 proficiency; most frequent language used; native language type; etiological factors; emotional significance of the language; and mode of language acquisition or use are thought to play a role in lateralization/localization of language (Vaid, 2008). These complex issues are not trivial in nature as there are millions of bilinguals (especially Spanish-English speakers) in the U.S.; therefore, there is a high likelihood that a neuropsychologist in a surgical center will need to a) provide baseline evaluation of cognitive (including linguistic) functions to determine whether epilepsy and/or a brain tumor has an adverse impact and b) will need to identify whether there is unique cerebral representation for L1 and L2 as this may pose a differential risk for language decline in the patient.

Functional brain mapping evidence has provided a unique way to assess brain organization in bilinguals. Ojemann and Whitaker (1978) were the first to conduct CSM in both L1 and L2 in two cases, and Rapport, Tan, and Whitaker (1983) found "partially distinct" and "partially overlapping" cortical representation of bilinguals' languages. That is, CSM selectively disrupted naming in only one of the languages, whereas CSM disrupted naming in both languages in other brain regions. Similarly, Lucas, McKhann, and Ojemann (2004) reported that stimulation reliably produced selective disruption in only one language in 21/22 bilingual patients. The sites associated with L1 versus L2 showed different distribution, with posterior temporal and parietal regions being more associated with L2-specific sites whereas anterior regions tended to show shared sites. When comparing L2 sites in bilinguals to monolingual L1 locations, an underrepresentation of eloquent cortex in bilinguals was observed for receptive language.

In contrast, eloquent language cortex for expressive skills have been described as more widely dispersed in the less proficient language (Rapport, Tan, & Whitaker, 1983), which may reflect increased cognitive demands on a bilingual patient.

Similar contradictory findings have been shown in functional imaging studies as some reports support overlapping fMRI activation patterns for Spanish-English bilinguals (Iles et al., 1999; Hernandez, Dapretto, Mazziota, et al., 2001), whereas Simos et al. (2001) found differential cortical representation for receptive language across Spanish and English in healthy volunteers using magnetic source imaging. To complicate matters further, early versus late acquisition of L2 may contribute to contradictory findings. Hull & Vaid's meta-analysis in (2007) revealed that early bilinguals exhibit bilateral hemisphere involvement in language processing, whereas late bilinguals showed greater left lateralization.

The overall impression is that the functional mapping data reveals considerable variability in the distribution of eloquent language cortex across various language tasks performed in L1 and L2, and may differ based on the languages the bilingual speaks. There are a limited number of studies specifically targeting Spanish-English bilinguals. Clearly more scientific work needs to be done in this area as a greater understanding of the neurocognitive aspects of bilingualism in Spanish-English speakers is needed so that effective and culturally-relevant decisions are made when planning specific treatments for Hispanic/Latino patients.

Future Directions: Going beyond the assessment to how to treat

Intervention Therapies with Bilinguals: Evidence and illustration within a pediatric framework since changing demographics are posing unique challenges for the

US educational and rehabilitation settings. Intervention for bilingual children with language disorders has become an increasingly controversial topic filled with myths, and neuropsychologists can often offer recommendations about the type of treatment a child needs. Questions such as "Should my child receive speech/language therapy in English, Spanish, or both?" are frequently asked of pediatric neuropsychologists. It is important to be knowledgeable about your local legislation as many states have outlawed bilingual education in favor of immersion programs. Additionally, single language versus dual language intervention/education remains in question. The limited literature on bilingual education for children with language impairments has been mixed. The historical view has been that children should focus on a single language. Researchers suggest that "the individual's proficiency in their first language will significantly determine the extent to which they can become proficient in the second language" (French & Llorente, 2008, p.89). However, this has been taken by many to mean that a single language must be chosen. For many Hispanics/Latinos, English is chosen as it is the language of instruction, but this task is next to impossible as Spanish remains the primary language at home. These children are then at a greater disadvantage because they now have even more limited communication with family members and miss out on the cultural learning and advantage that bilingualism can bring. This may even lead to a shift in ethnic identity development and sense of belonging in their community.

There have been new challenges to this single-language notion. With respect to educational programming, Collier (1995) found that children with formal schooling in their native language (L1) prior to English immersion took approximately 5-7 years to gain proficiency. However, those children who had no formal schooling in L1 prior to

language immersion took 7-10 years to gain proficiency (Collier, 1995; Cummins, 1981). Considering brain development and increased connectivity with use, if an individual has the basis for the rules of language, then they are more likely to build upon those rules and learn L2 at a much faster rate. Even for children without a language disorder, placing them in an immersion program does not help them advance in English proficiency as much as a dual language program does (Thomas and Collier, 2002). These researchers postulated that children may lose ground in both languages and are required to make more gains per year than the average native-English speaker in order to catch up to their grade level.

Speech and language therapy is another intervention in which single language intervention has been the historical norm. As discussed above, improving one language will assist with the acquisition of the second language, and native spoken language proficiency has been associated with later literacy levels. However, English is often chosen as the starting language. We propose that if a single language is to be chosen, that individual variables be considered before selecting English as the language for intervention. For example, young children who spend the majority of time with family members should receive increased intervention in Spanish. Ideally, intervention focused on both languages would be beneficial. While limited, research has also shown benefit from intervention in both languages (Kohnert, 2010; Thordardottir, 2010; Tsybina & Eriks-Brophy, 2010). In her literature review, Elin Thordardottir (2010) found few articles assessing the efficacy of language interventions for bilingual children, but all agreed that both languages should be included in the intervention. In fact, “the literature search did not yield a single published study showing a monolingual focus in intervention

to be superior to a bilingual focus" (Thordardottir, 2010), and similar to what French and Llorente (2008) summarized, studies showed that L1 facilitates acquisition of L2. A preschool intervention study by Tsybina and Eriks-Brophy (2010) showed benefit from children receiving L2 support by a clinician and L1 support by parents. This may be burdensome to some families, but can help to address the gap created by lack of bilingual speech-language providers. Thordardottir (2010) reviewed recommendations by three major speech-language associations all citing that therapists working with bilingual children be native or near-native in their language proficiency, have awareness of cultural variability, and be able to conduct the assessment and intervention in that language. They also reportedly recommend the use of interpreters when a bilingual speech-language pathologist is not possible.

Evaluating Hispanic/Latino patients with neurological disorders: How to apply lessons learned in the medical setting. Neuropsychologists play a central role within multidisciplinary teams that treat patients with medically complex disorders; however, there is a paucity of psychometrically-sound neuropsychological measures available for use with Hispanics/Latinos, which is disconcerting since they represent a large portion of the population. Cultural competence in medical settings is paramount as racial/ethnic background may influence health attitudes and behaviors (such as compliance), as well as moderate outcomes (Yeates et al., 2002). Despite the increasing emphasis for evidence-based practice in the field of neuropsychology, the momentum for research focusing on pediatrics and cultural diversity (especially with regard to Hispanic/Latino children) has stalled. Byrd, Arentoft, Scheiner, et al. (2003)'s comprehensive literature review of 1834 articles focusing on pediatric neuropsychology topics highlights the problem: they

reported that only 10 manuscripts (or 1%) met the following inclusion criteria: a) were peer reviewed; b) directly examined culture/ethnicity on test performance; and c) used at least one standardized neuropsychological measure. Even in well-established clinical research areas such as epilepsy, one of the top 5 diagnoses encountered by pediatric and adult neuropsychologists alike (Sweet, Nelson, & Moberg, 2006), where neuropsychologists have played a pivotal role in pre-surgical planning for decades (see Loring, 2010 for a review of the history of neuropsychology in epilepsy), there is an abysmal lack of assessment tools and outcome studies focusing on Hispanics/Latinos. Indeed, the primary author was only able to identify two publications to date focusing on cognitive outcomes in epilepsy and Hispanic/Latinos in the U.S. after conducting a comprehensive literature review and communicating with colleagues around the country (please see Barr et al., 2009; Marques de la Plata et al., 2009). Hence, neuropsychologists who are called upon to assess Spanish speaking patients in order to determine current cognitive functioning within the context of intractable epilepsy; identify lateralizing/localizing signs and detect neuropsychological changes in response to interventions (i.e., anti-epileptic drugs or neurosurgery) are at a significant disadvantage (and clearly the patients!).

Barr and colleagues (2009) are the only group to provide empirical evidence to support the sensitivity of a cognitive battery used with Spanish speaking epilepsy surgical candidates. Using the Neuropsychological Screening Battery for Hispanics (NeSBHIS, Ponton, Satz, Herrera, et al., 1996), they reported that a large proportion of their patients with epilepsy present with impairments in confrontation naming (41.4%); mental tracking (40%); verbal delayed recall (29%) and visuospatial delayed recall (26%); however, no

significant differences were found in memory performance between left- and right-temporal lobe epilepsy groups. In contrast, Marquez de la Plata and others (2009) described the expected material-specific memory pattern in their epilepsy sample. That is, left temporal lobe epilepsy patients exhibited significantly lower performance on a list-learning task compared to those with right temporal lobe epilepsy. Notably, this group utilized the Spanish Verbal Learning Test (SVLT) which is not solely a Spanish translation (as is the case for the WHO-AVLT), but a measure composed of words based on frequency and ease of semantic categorization. It is plausible that this more rigorous linguistic and culturally-sensitive approach to test development specific to Spanish speakers may be associated with its greater sensitivity for detecting memory problems.

Given the general lack of information available and the high likelihood of having to evaluate a Spanish speaking patient with epilepsy, since it is one the most common neurological disorders in the U.S., the primary author developed this checklist for practitioners to utilize in clinical practice (see Table 6). Some measures are part of the recommended National Institute of Neurological Disorders and Stroke (NINDS) Common Data Elements (CDE) for epilepsy neuropsychology while others are complimentary to allow for a more detailed assessment approach.

Table 6. Adult Neuropsychology Spanish Epilepsy Battery

[ ] Bilingual Acculturation Scale (BAS) Modified Version
[ ] Marin & Marin Acculturation Scale
[ ] Word Accentuation Test-Chicago (Krueger, Lam & Wilson, 2006)
[ ] Wechsler Adult Intelligence Scale-III (Choca et al., 2009)
[ ] Wechsler Adult Intelligence Scale-IV short form (Vocabulary/Similarities/Block Design/Matrix Reasoning

[ ] Wechsler Adult Intelligence Scale-IV Working Memory and Processing Speed Indices

[ ] Ponton/Satz 30 item version (NeSBHIS)

[ ] WHO Auditory Verbal Learning Test (NeSBHIS)

[ ] Verbal Prose Memory Test (Bateria Neuropsicologia en Espanol)

[ ] Grooved Pegboard (English norms)

[ ] CPT-2 (English norms)

[ ] F-A-S/Controlled Oral Word Association Test (NeSBHIS)

[ ] P-M-R Phonological Fluency (Bateria Neuropsicologia en Espanol)

[ ] Category Fluency (NEUROPSI)

[ ] Trail Making Test (Drane et al., 2002)

[ ] Rey-O Copy/Immediate Recall/Long Delayed Recall/Recognition (NeSBHIS)

[ ] 18-21 CELF-4 Recalling Sentences (+complete battery, as needed)

[ ] 21+ Multilingual Aphasia Examination**,** Repetition subtest (Rey)

[ ] Tower of London-Drexel Version, Second Edition (English norms)

[ ] Wisconsin Card Sorting Test (Bateria Neuropsicologia en Espanol)

[ ] Bateria Woodock-Muñoz Pruebas de Aprovechamiento/Pruebas de Habilidad Cognitiva-III: Letter Word Identification; Word Attack; Calculation

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Conclusions

The increasing number of Hispanics/Latinos in the U.S., together with the continued use of Spanish by these individuals and the continuation of engagement with their culture of origin, introduces error in diagnostic and interventions of neuropsychological patients. Unfortunately, the numbers of professionals is increasing at a rate that does not match these demographics. Further, those Spanish-speaking professionals, as a rule, are not typically engaged in training and research. Hence, the

ratio of linguistically and culturally competent professionals to Hispanic/Latino patients is continued to increase. The situation is becoming increasingly alarming and, for reasons not entirely clear, clinical neuropsychology is paying limited attention to this growing crisis.

It is also important to note that there is much more to evaluating Spanish speakers than simply linguistic variances. In the upcoming revision of the standards, there is greater attention to both linguistic and cultural issues. The possibility exists, though the research is not present to support a hypothesis, that culture may be more important and more difficult to measure than linguistic variations.

Finally, interfacing with this tsunamic demographic change is not only professionally the right thing to do but it will expand the generalizability of clinical neuropsychology. To make the specialty have impact, all individuals must be understood and served.

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Addendum. *Practical Steps to Improving Cultural Competence with Hispanic/Latino patients*

Listed are several ideas that have emerged with conversations of other Spanish-speaking neuropsychologists:

1) Obtain informal and formal Spanish language instruction
2) Seek immersion/emersion experiences, if possible
3) Complete doctoral curricula on broad topics related to multi-cultural issues
4) Seek opportunities to gain clinical experience and training with Hispanic/Latinos with appropriate supervision
5) Be informed of test psychometrics and strengths/limitations of measures available to be used with Hispanic/Latino patients
6) Use sophisticated and robust methods of neuropsychological assessment with a Spanish or bilingual speaker (i.e., avoid constraints in your evaluation by solely relying on nonverbal tests)
7) Gain knowledge by reading pertinent literature specific to Hispanic/Latino population (including reading scientific journals in Spanish from other countries)
8) Attend continuing education courses that emphasizes multi-cultural theoretical or applied topics, especially those emphasizing Hispanic/Latino issues
9) Consult with peers and professionals
10) Join neuropsychological organizations that focus on Hispanic/Latino issues, such as the Hispanic Neuropsychological Society