DEVELOPMENT OF THE TEXAS SPANISH NAMING TEST:

A TEST FOR SPANISH SPEAKERS

APPROVED BY SUPERVISORY COMMITTEE

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This work is dedicated to my wife,

Teresa Marquez de la Plata,

who taught me the true meaning of

sacrifice in the name of Love.

DEVELOPMENT OF THE TEXAS SPANISH NAMING TEST:

A TEST FOR SPANISH-SPEAKERS

by

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ABSTRACT

The elderly Hispanic population is growing at a rapid pace, although very few neuropsychological measures are developed in Spanish, as most tests are translated versions of their English-language originals. The construct validity of these instruments with Spanish-speakers is virtually unexamined and bias may result due to cultural differences between the population the original tests were

intended for and the Spanish-speaking populations they are used with. The current investigation used culturally salient words to develop the Texas Naming Test (TNT), a confrontation naming test for Spanish-speakers. Eighty-five (55 nondemented and 30 demented) Spanish-speaking primary care clinic patients were administered this test to determine its psychometric qualities. The TNT demonstrated very good internal consistency (alpha = 0.9) and good convergent validity, as it correlated highly with translated Spanish-naming tests commonly used in clinical practice ($r \geq 0.80$). Multivariate analysis of covariance and logistic regression demonstrated that performance on the TNT was not significantly influenced by acculturation, though the test did relate to both education ($r = 0.48$, $p < .001$) and acculturation ($r = 0.41$, $p < .001$). As predicted, the TNT effectively detected differences between demented and nondemented individuals, and demonstrated a high level of sensitivity (100%) for dementia when using an optimal cut score of ≤ 23. Furthermore, ROC curve analysis demonstrated the overall discriminant utility of the TNT was comparable to a literal Spanish translation of the Boston Naming Test (MBNT-S), but better than a translated short form of the BNT (15-SNT). Data from this investigation suggest the TNT may be clinically useful where dementia among Spanish-speakers is suspected. Further exploration is needed to determine the extent to which culturally salient words contribute to greater sensitivity.

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INTRODUCTION

Statement of the Problem

Hispanics are the fastest growing minority in the United States and expected to grow from 12% of the American population in 1995 to 24% by the middle of the 21st century (United States Bureau of the Census, 2000). The United States Bureau of the Census (1993) reports Hispanic elderly will grow to be a large proportion of elderly Americans and of all Hispanics. The number of older Hispanics in the United States are projected to increase at a rate of 555% between 1990 and 2030 (United States Bureau of the Census, 1996).

As rates of older Hispanics rise in the United States, the number of Hispanic individuals with dementia will also increase (United States Bureau of the Census, 1993). It has been reported that Hispanics have a greater prevalence rate of dementia than non-Hispanic Whites (Gurland, Wilder, Lantigua et al., 1999; Tang, Stern, Marder et al., 1998). A large-scale epidemiologic study examining prevalence rates of dementia in three ethnoracial groups found Hispanics have a higher prevalence of dementia than African Americans and non-Hispanic whites (Gurland et al., 1999). A recent report applying an estimated prevalence rate of Alzheimer's disease (AD) in Americans over the age of 65 to projections for 2050, warns that the prevalence of AD could increase 600% by that year (Alzheimer's Association, 2004). These data suggest an increased need for health care among older Hispanics in the United States.

Unfortunately, as Hispanics grow in numbers, so does the gap between them and Spanish-speaking health care providers. Ortiz and Fitten (2000) found Hispanic elderly delay seeking medical attention prior to and especially after the onset of cognitive symptoms. They also found language proficiency, second only to physician understanding of their personal beliefs, was a barrier to healthcare access for Spanish-speaking Hispanics. Spanish is the second most common language spoken in American homes, and Spanish-speakers have increased 62% to 28.1 million from 1990 to 2000. Furthermore, 49 % of individuals who speak Spanish report they do not speak English very well, and 20% of these individuals do not speak English at all (U.S. Bureau of the Census, 2003). It is naïve to think that Spanish-speaking health care providers can keep pace with the growth of the Hispanic population and bridge this communication gap.

Neuropsychology, the study of the relation between brain function and behavior (Kolb & Wishaw, 1998), is commonly used to differentiate neurocognitive conditions that have different treatments and medical management (e.g., dementia versus pseudodementia). Neuropsychological evaluation typically involves the assessment of various cognitive functions (i.e. memory, attention, executive functions, and language) with standardized instruments. The assessment of Spanish-speakers primarily utilizes test instruments developed in English and translated into Spanish. Assessment of language functions for Spanish-speakers includes the use of naming tests with largely unknown and

arguably questionable validity. Assessment of naming ability is very important in the neuropsychological assessment of older adults as they are often used to to detect language impairment associated with the early stages of AD (Bayles, & Tomoeda, 1983; Frank, McDade, & Scott, 1996; Lichtenberg, Vangel, Kimbarow, & Ross, 1996). Naming tests call for a patient to name a series of objects depicted in a drawing. This task is obviously highly verbal and Spanish-speakers are at a disadvantage on such tasks (Harris, Cullum, & Puente, 1994; Howley, 2003; Ellis & Hennelly, 1980; Ponton, Satz, Herrera et al., 1996; Taussig, Henderson, & Mack, 1992; Valencia & Rankin, 1985). Neuropsychologists are faced with a challenge when evaluating naming ability as well as other language related cognitive functions in Spanish-speakers as few adequately developed and normed instruments exist.

Purpose of the Study

This study seeks to develop a naming test in Spanish for use as an alternative to English naming tests that have been translated into Spanish. The principle investigator (PI) utilized psycholinguistic variables to select culture appropriate words for the development of the first naming test comprised of Spanish-relevant items. The study also examined the reliability and validity of this instrument utilizing normal and demented older Hispanic adults. Additionally, normative data for this population are made available from the results of the study.

REVIEW OF THE LITERATURE

Overview

Neuropsychologists in the United States often attempt to bridge the communication gap with Spanish-speakers by employing interpreters and using translated cognitive tests. These methods may not be effective for neuropsychological evaluations. The following literature review outlines the problems associated with using these means for psychological and language-intensive neuropsychological assessments, and describes an alternate method of assessing naming ability. The present study developed a new measure of naming ability for older Spanish-speaking Hispanic adults, and examined the reliability and validity of this measure.

Use of Interpreter Services in Neuropsychological Assessments

As the population of predominantly Spanish-speaking elderly increases, healthcare providers find themselves utilizing interpreter services to meet the demands of their patients. In a national survey of 83 public and private hospitals, 11% of patients required interpreter services to communicate with their medical provider (Ginsberg, Martin, Andrulis, et al., 1995). One third of these hospitals reported 27% of their patients required interpreter services. However, this practice has been shown to have serious limitations. One problem is that there is no standard training for interpreters or for health care providers on how to utilize interpreter services, as only 25% of hospitals trained their staff in interpretation

and only nine of 83 hospitals surveyed trained their volunteer interpreters (Ginsberg et al., 1995). Most often, interpreting is done by hospital staff, family, or friends who are untrained in proper interpretation techniques (Baker, Parker, Williams et al. 1996; Ginsberg et al., 1995). The practice of using interpreters during a physician's evaluation often results in edited, reorganized, and summarized versions of what was said by both the clinician and the patient (Diaz-Duque, 1982; Ebden, Bhatt, Carey, Harrison et al., 1988; Marcos, 1979; Putsch, 1985; Serrano, 1989). Approximately a quarter to half of physicians' questions are either misinterpreted or not interpreted at all, and inadequate interpretation has been shown to result in misdiagnosis in psychiatric interviews (Ebden et al., 1988; Marcos, 1979).

In neuropsychology, possibly the biggest problem with using interpreters is that one may lose pertinent information about patients' cognition when evaluating them through a proxy (Sabin, 1975). When using an interpreter or a family member as an interpreter during a cognitive evaluation, a clinician may not feel comfortable making judgments regarding the patient's thinking because the objective evidence of cognitive dysfunction usually found in speech may be filtered by the interpreter who may not know the importance of delivering unedited facts to a neuropsychologist. An untrained interpreter may edit and reorganize a patient's speech in an attempt to facilitate communication between a patient and his or her health care provider (Sabin, 1975). Unfortunately, this may

hide subtle signs of cognitive impairment or at least bias the evaluation of a Spanish-speaking patient.

Patients' diagnosis and treatment can be biased by inadequate interpretation (Baker, Hayes, & Fortier, 1998; Sabin, 1975). Baker, Hayes, and Fortier (1998) reported that approximately 20% of patients who require an interpreter reported an interpreter was not used. Furthermore, patients who do communicate through an interpreter are less likely to know their diagnosis and report they wish their provider would have explained things better than individuals who communicated directly to their provider (Baker et al., 1996; Baker, Hayes, & Fortier, 1998). The patient-physician relationship may also be less effective when the physician is untrained in working with Hispanic patients (Ravel & Smith, 2003). It is known that mental health care practitioners find it difficult to build a constructive working alliance with interpreters, and this has a negative effect on their ability to establish therapeutic alliances with families (Echemendia, Harris, Congett, Diaz, & Puente, 1997; Ravel & Smith, 2003).

A survey of neuropsychologists found that 83% of respondents did not feel adequate working with Hispanic patients, and 32% reported their training was "totally inadequate" (Echemendia, Harris, Congett, Diaz, & Puente, 1997). Among the errors untrained health care providers can commit are failure to consider age, education, level of acculturation, bilingualism, and cultural differences in cognition (Ardila, 1995; Butcher, 1996; Harris, Cullum, & Puente,

1995; O'Brien, 1989; Perez-Arce, 1999; Ponton & Ardila, 1999; Puente & McCaffrey, 1992; Ravel & Smith, 2003). These types of errors may lead to a sense of feeling disconnected with or misunderstood by their provider (Haffner, 1993; Slomski, 1992), either of which may impede patients' cooperation with recommended treatment regimens (Bertha, 1992; Marcos, 1979; Perez-Stable, 1987).

Use of Translated Assessment Instruments

Another way health care providers attempt to bridge the communication gap Spanish-speakers in the United States is to translate assessment instruments from English to Spanish. Very few neuropsychological tests are developed for Spanish-speakers; therefore, evaluations typically utilize assessment instruments that have been translated into Spanish. The assessment procedure for Spanish-speaking patients can introduce error into clinical interpretation in several ways. For example, to administer such tests to Spanish-speakers, test instructions and items are subject to a translation and backtranslation processes (Brislin, 1980; Brislin, Lonner, Thorndike, 1973; Karno, Burnam, Escobar, Hough, & Eaton, 1983). This process involves translating the test from English into one of many dialects of the Spanish language, then having someone else translate the test from Spanish to English again, and finally the parties reconcile any translation discrepancies that exist. This process may still introduce more error variance than

if the words were originally written in Spanish, as error is possible anytime raw data is processed to take a new form.

Normative Data

Most neuropsychological measures do not have adequate norms for Spanish-speakers, as they are normed on English-speaking individuals. Translated versions of commonly used measures have little empirical data on Spanish-speakers from which to base conclusions; thus, interpretation of these data for this population can be challenging. Commonly used neuropsychological measures, across cognitive functions, that require basing interpretation on their respective original norms that underrepresent Hispanics and/or neglect Spanish-speakers include: Controlled Oral Word Association Category Fluency Test (COWA; Spreen & Straus, 1998), Wisconsin Card Sorting Test (WCST; Berg, 1948), and Wechsler Memory Scale-3rd Edition (WMS-III; Wechsler, 1997). For example, the COWA Category Fluency test was developed in English and is normed in terms of age and education with English-speakers. This test requires the patient to name as many animals in Spanish as they can in 60 seconds; however, it is not known whether a Spanish-speaker is expected to produce more or less names of animals in the time allotted than an English-speaker of equal age and education.

In contrast, the MMSE (Folstein, Folstein, & McHugh, 1975) and the Dementia Rating Scale (Mattis, 1988) have undergone literal translation from

English to Spanish for use with Spanish-speakers and some normative data exist (Arnold, Cuellar, & Guzman, 1998; Bird, Canino, Rubio-Stipec, & Shrout, 1987; Escobar, Burnam, Karno, Forsythe, Landsverk, et al., 1986; Taussig et al., 1992). However, these tests have shown that Spanish-speakers perform worse than their English-speaking counterparts (Arnold et al., 1998; Espino, Lichtenstein, Palmer, & Hazuda, 2004; Hohl, Grundman, Salmon, Thomas & Thal, 1999; Taussig et al., 1992). These data suggest the possibility that the translations do not render the tests equal in terms of obtaining an accurate measure of cognitive ability. It is possible that the Spanish translation is not comparable to the English versions of these tests due to educational, cultural, or linguistic biases in the translations. For example, the optimal cutoff score for the MMSE to identify cognitive impairment with English-speakers is 26/27 (Galasko, Klauber, Hofstetter, Salmon, Lasker et al., 1990) but the cutoff must be lowered to 22/23 for Spanish-speakers. If the typical cutoff score is observed with Spanish-speakers there is an increased rate of normal individuals identified as cognitively impaired (i.e. decreased specificity; Beamen, Beamen, Pena et al., 2004; Ostrosky-Solis, Lopez-Arango, & Ardila, 2000).

Construct Validity

The disparities between English neuropsychological tests and their translated counterparts may be due in part to conceptually inequivalent, or construct invalid, translations. A recent chapter discussed the principles involved

in the development of neuropsychological tests in Spanish and issues pertaining to validity (Gutierrez, 2002). Construct-related validity appears to be the most important aspect of developing a test in Spanish that is culture-reduced, as careful translation-backtranslation may promote a test's content validity (Brislin, 1980; Geisinger, 1994) but does not address its construct related validity. Construct-related validity refers to how well a defined phenomenon is measured with a given instrument. In cross-cultural research one must determine if the phenomenon of interest can be measured in the same manner across cultures. For example, in cross-cultural neuropsychological test development, a test of language ability may undergo a process that aims to take an idea in one language and put it in a different language without changing it (Geisinger, 1994), but it may not measure language function if the words used in the test are not as relevant in one language as they are in the second.

For example, Lowenstein (1995) evaluated English and Spanish-speaking individuals with AD to determine the ability of various English and Spanish-translated neuropsychological measures to predict functional abilities. They found significant differences between groups for half of the neuropsychological tests administered, and found fewer Spanish-translated neuropsychological tests were significantly related to functional ability than English tests. These results suggest translated neuropsychological tests may be less able to measure the

construct they intend to measure (i.e. functional ability), and therefore may not be an optimal method of assessing the cognitive functions of a Spanish-speaker.

Education Influences Neuropsychological Performance

Education is another factor contributing to differential neuropsychological performance between English- and Spanish-speakers, as it is known to influence many neuropsychological tests, including naming tasks (Anthony, Heaton, & Lehman, 1980; Benton et al., 1983; Finlayson, Johnson, & Reitan, 1977; Heaton Grant, & Matthews, 1991; Ross & Lichtenberg, 1998). Several studies conclude disparity between English and Spanish-speakers on neuropsychological tests is due at least in part to relatively lower levels of education among Spanish-speakers (Ardila et a., 1994; Bird, Canino, Stipec, & Shrout, 1987; Beamen et al., 2004; Cervantes & Acosta, 1992; Harris et al., 1995; Ponton et al., 1996). These studies have recognized this complication and have attempted to create normative data for Spanish-speakers. The authors of these studies conclude neuropsychologists must use tests with norms that approximate the demographics of each particular patient tested. However, as stated above, many of these investigators examined neuropsychological tests that have been translated for content equivalence and not necessarily construct equivalence. Therefore, it cannot be assumed Spanish-speakers react similarly to the test stimuli. Psychometrically, construct equivalence, or construct validity, must be established before one can draw

conclusions about the influence of demographic variables on a particular measure (Anastasi, 1988).

Acculturation Influences Neuropsychological Performance

Culture can also influence the results of neurocognitive evaluations. Acculturation is a construct that describes the process by which people of a foreign culture adopt the behaviors and attitudes of the host culture (Sciarra & Ponterotto, 1991). It is a multifaceted construct that encompasses personal values, behaviors, and language of choice. Less acculturated Latinos living in the United States have limited involvement with the dominant culture. For instance, less acculturated Latinos may speak Spanish to the exclusion of English, and may shop at a predominantly Hispanic market place. It is known that less acculturated individuals are negatively correlated with mental health status, social support, and health behaviors, as assessment situations may be novel and uncomfortable to these individuals and evaluation results may be confounded with cultural differences and discomfort (Marin & Marin, 1991).

Furthermore, several studies suggest differential neuropsychological performance between distinct cultures is due to acculturation (Lichtenberg, Ross, Christensen, 1994; Manly, Jacobs, Sano et al., 1998; Whitfield et al., 2000). For example, Manly (1998) compared Caucasian nondemented individuals with an age- and education-matched sample of African Americans and found differences in figural memory, verbal abstraction, category fluency, and visuospatial skills.

She also noted differences in confrontation naming and the WAIS-R Information subtest (Wechsler, 1981) were attributed to cultural differences among the African American sample, as individuals with less acculturation, measured by the African American Acculturation Scale (Landrine & Klonoff, 1995), scored lower than individuals with greater acculturation on these tasks.

Acculturation among Hispanics has been assessed either by self-report measures (Hazuda, 1988; Marin, Sabogal, Perez-Stabel, 1987; Mendoza, 1989), or length of residency in the United States. While more formal and lengthy self-report measures of acculturation provide an abundance of information regarding an individual's incorporation or resistance of the majority culture's norms, most studies in this area prefer to use length of residency a measure of acculturation because it is much quicker to obtain and has shown to be correlated to neuropsychological performance (Artiola i Fortuny et al., 1998; Gasquoine, 2001).

Neuropsychological Tests Developed in Spanish

Using tests that have been translated and have achieved content equivalence does not eliminate differences in test performance across linguistic groups (Arnold et al., 1998; Espino, Lichtenstein, Palmer, & Hazuda, 2004; Hohl, Grundman, Salmon, Thomas & Thal, 1999; Taussig et al., 1992). This raises the possibility that the construct of interest is altered when translating items from one language to another. Perhaps a more effective way to reduce cultural and

linguistic biases in neuropsychological tests is to create construct-equivalent tests in Spanish and obtain normative data on them. This strategy, although challenging, can produce adequate assessment instruments for Spanish-speakers such as the Spanish Verbal Learning Test (SVLT; Harris, Cullum, & Puente, 1994) and the Culture-reduced Assessment of Neuro-cognitive Abilities (CANA; Gutierrez, 2002). The SVLT is a Spanish list-learning and memory task developed in accordance to the procedures described in the development of the California Verbal Learning Test (CVLT; Delis, Kramer, Kaplan, & Ober et al., 1987), a popular measure of verbal learning and memory. The authors of the SVLT created two 16-word lists, one in English and the other in Spanish. Their attempt to create construct-equivalent tests included choosing each word according to how familiar it is to individuals who speak the respective languages. Words with similar familiarity ratings across the two languages were included in the lists. Harris et al. (1994) administered both lists of words to a group of monolingual English-speakers, a group of balanced bilingual individuals (English and Spanish), and a group of nonbalanced (i.e. Spanish dominant) bilingual individuals. Their results showed that balanced bilingual individuals scored significantly higher than nonbalanced bilingual individuals on the English list-learning task, but performed equal to nonbalanced bilinguals on the Spanish verbal learning task. They concluded that the lists were correlated despite being

written in different languages. Furthermore, these data demonstrate construct-related validity by continuing to measure the same construct across languages.

The CANA, a recently created test of global cognitive abilities for Spanish-speakers, was developed with much attention given to construct validity. The CANA is modeled after the MMSE but created specially for Spanish-speaking individuals. The test's developers started by writing items that incorporated concepts and relationships commonly recognized by Spanish-speakers. For example, the MMSE item calling for an examinee to repeat the phrase "no ifs, ands, or buts" is not common among Spanish-speakers and was changed to "Mother wants chicken and rice from the market." The authors initially wrote the items in English, as it was their shared language, and later translated and backtranslated the items into Spanish. However, they did not translate the items literally, as literal translations may not adequately convey the meaning of a test item. To illustrate this point, the authors of the test offered an orientation item as an example: "What is your age?" Literally translated this item reads "Que es su edad?" However, this sentence is awkward to a Spanish-speaker who is accustomed to being asked "Cuantos anos tienes?" Likewise, this sentence sounds odd to an English-speaker as it means "How many years do you have?" The thoughtful writing of items and reorganization of sentence structure during the translation process are challenges met by the developers of the CANA

in efforts to preserve the construct of interest. However, while optimistic, the authors point out that its construct validity has not yet been fully examined.

The alternative to developing new construct-equivalent neuropsychological tests is to continue translating the content of English tests. However, many tests are found to be less appropriate for translation than others (Harris, Cullum, Puente, 1994; Howley, 2003; Ellis & Hennelly, 1980; Ponton et al., 1996; Taussig et al., 1992; Valencia & Rankin, 1985). For instance, Ellis and Hennelly (1980) demonstrated a simple translation of the numbers used in the Digit Span subtest of the WAIS (Wechsler, 1955) showed higher scores for English-speakers than for individuals who spoke Welsh. They concluded the difference was attributed to longer length of syllables of the numbers in Welsh. Likewise, Valencia and Rankin (1985) studied monolingual English and Spanish preschool children of similar ages using the original McCarthy Scales of Childrens Abilities and a Spanish translation and found differences between the two groups for verbal and numerical memory tasks. Upon closer examination, they found the Spanish items had 65.9% more syllables than the English items. They concluded that the Spanish-speaking children scored lower on these memory tasks than their English-speaking counterparts because their translated items were significantly longer. These studies suggest that some neuropsychological tests, especially verbal tasks, are problematic when translated, and may need to be

developed in Spanish. It is this investigator's contention that naming tasks are among the tests inappropriate for translation.

Spanish Naming Tests

Confrontation naming tests are verbal tasks typically included in neuropsychological evaluations due to their utility in evaluating aphasia and early stages of dementia (Bayles, & Tomoeda, 1983; Frank, McDade, & Scott, 1996; Lichtenberg, Vangel, Kimbarow et al., 1996). Naming tests involve presenting examinees a series of line drawings and asking him/her to name the objects depicted. The Boston Naming Test (BNT; Kaplan, Goodglass, & Weintraub, 1983) is the most frequently used naming task and has been translated and modified several ways for use with Spanish-speakers. The Spanish BNT (Kaplan, Goodglass, Weintraub, 1986), for example, is a literal translation of the original BNT. The Spanish BNT uses the original 60 pictures to elicit word finding responses. Normative data for this test were generated using 200 healthy control subjects from Buenos Aires, Argentina (Allegri, Mangone, Villavicencio, Rymberg, & Taragano, 1997). However, because it cannot be assumed that an English word translated into Spanish has equivalent psycholinguistic qualities (i.e. frequency, familiarity, age of acquisition), these investigators also recommended a more linguistically appropriate order of test items. They reordered the 60 items according to frequency of correct responses, with more frequently correct items presented before more difficult items.

The modified Spanish version of the Boston Naming Test (MBNT-S; Ponton, Satz, Herrera et al., 1992) utilizes only 30 of the original 60 items from the BNT. These authors utilized expert judges to rate the original items, chose their items with respect to item appropriateness, and reordered them according to judged level of difficulty. More specific details regarding test development are unpublished. Norms for this test were collected from Spanish-speaking subjects in the Los Angeles area and are stratified by gender, age, and education (Ponton et al., 1996). Another modified version of the BNT exists in Spanish entitled the 15-item Spanish Naming Test (15-SNT; Ardila, Rosselli, & Puente, 1994). The 15-SNT includes six of the items of the original BNT and adopted nine new items. The items were ordered with respect to frequency of use in the Spanish language.

Performance on naming tasks in both English and Spanish are known to be influenced by several factors including age (Albert, Heller, & Milberg, 1988; Alegri et al., 1997; Heaton, Miller, Taylor, & Grant, 2004; Ponton et al., 1996; Ramsay, Nicholas, Au, Obler, & Albert, 1999; Ross & Lichtenberg, 1998). For example, a cross-sectional study of naming ability in healthy subjects ages 30-80 years found significant changes in naming ability after 60 years of age (Albert, Heller, and Milberg, 1988). In addition, a longitudinal study examining individuals across the life-span found healthy subjects over age 70 made more naming errors at each wave of assessment than younger individuals (Ramsay, Nicholas, Au, Obler, & Albert, 1999). However, in cross cultural studies there

are other variables that may have significant influences on naming performance, including education, acculturation, and the properties of words used in the naming test (i.e. linguistics). Differences in naming ability across cultures will be now reviewed and explained with regards to these variables.

Differences in Naming Performance Across Cultures

While the aforementioned naming tests provide an option to neuropsychologists who evaluate Spanish-speakers, they are all derived of a test developed in English for English-speaking patients in a predominantly Anglo-American culture. Studies have found differential performances between English- and Spanish-speakers on the BNT and the Spanish translations of the BNT, respectively (Loewenstein 1995; Taussig et al., 1992). Loewenstein (1995) studied a group of elderly English-speaking subjects with AD and a group of Spanish-speaking subjects with AD. In addition to finding the education level of the English-speaking sample significantly higher than that of the Spanish-speaking group, their results show that the BNT was significantly correlated with measured functional ability among English-speakers, but not correlated to functional abilities among Spanish-speakers. This suggests that the BNT is heavily influenced by education and may not reliably measure functional abilities in Spanish-speakers.

Educational Influences on Naming

It is well known that education affects performance on the BNT. Studies demonstrate this by showing significant differences between Caucasians and African Americans secondary to culture differences despite similar languages (Heaton, Miller, Taylor, & Grant, 2004; Lichtenberg, Ross, & Christensen, 1994; Ross & Lichtenberg, 1998). For example, Ross & Lichtenberg (1998) found education was significantly correlated to BNT performance, accounted for approximately 14% of variance in BNT scores, and recommended normative data for clinical use should be selected with regard to the demographic characteristics of the patients being assessed.

Along those lines, Ponton et al. (1996) and Allegri et al. (1997) both claim one should use tests with norms that match patients' demographics and language. Ponton et al. (1996) examined 300 volunteers from community centers of greater Los Angeles area ranging in age from 16-75 years. Seventy percent of their sample was monolingual Spanish-speakers and the majority of them had not lived in the United States long nor did they have much formal education. The investigators administered the BNT-PS to this sample and found small differences in level of education yielded large differences in performance. They concluded that for this reason translation or adaptation of a naming test is not a substitute for stratified norms.

Allegri et al. (1997) reached the same conclusions by administering the BNT-S to 200 normal Spanish-speaking individuals from Argentina between the ages of 30-82 years. Approximately 31% of this sample reported having less than 7 years of formal education, and approximately 70% of the sample did not obtain any post-high school education. These investigators observed a significant correlation between education and naming performance that is not usually found among English samples with greater than 12 years of education (Kaplan, Goodglass, & Weintraub, 1983; La Barge, Edward, & Knesevich, 1986; Van Gorp, Satz, Kiersch, & Henry, 1986). They concluded that these education-related differences occur in less educated individuals, and recommended that norms for a Spanish-naming test be stratified by education.

Cultural Influences on Naming

Taussig et al. (1992) compared neuropsychological performances among 4 subject groups: English-speaking normal controls (NC) and patients with AD, and Spanish-speaking NC and patients with AD. The four groups were compared in terms of various neuropsychological tests translated into Spanish. They found no differences between English and Spanish-speakers for most of the tests in their battery; however, there were significant differences in mean performance between Spanish- and English-speaking NC on several language intensive tests such as the BNT and the COWA. These results suggest the possibility that translated neuropsychological tests from one language to another may not be equivalent. It

appears some neuropsychological tests may be translated into Spanish without significantly degrading their validity, however the BNT does not lend itself well to translation as its items may not be culturally relevant to Spanish-speakers.

As mentioned earlier, an individual's level of acculturation may affect their performance on psychological assessments. Language, the most easily measured aspect of acculturation, accounts for the majority of the total variance (up to 64.6%) of acculturation on some acculturation scales (Cuellar, Harris, & Jasso, 1980; Marin, Sabogal, Marin, Otero-Sabogal, & Perez-Stable, 1987). Therefore, it is likely an Hispanic individual with limited acculturation may be most comfortable and familiar with a language other than English, and may be unfairly penalized on a naming test for incorrectly naming an object that is linguistically or culturally biased (i.e. less salient in the Spanish language or Hispanic culture as it is in English or in the majority culture).

Linguistic Factors Influence Naming

Word Frequency

Word frequency has been studied by linguists and found to be a viable way of measuring the relative salience of one word over another (Alameda & Cuetos, 1995; Kucera & Francis, 1967). Likewise, it can also illustrate gross differences in word saliency between two languages. One example of differences across cultures is the word "church." The word "church" is very salient in English, measured via word frequency, as it appeared in published prose 348

times in 1961 (Kucera & Francis, 1967), however, it is less salient in Spanish as it only appears in written Spanish works 109 times during the 15-year period between 1978-1993 (Alameda & Cuetos, 1995). Frequency of word use across languages, and ultimately cultures, may affect accuracy of naming just as it is often found to affect naming ability within the English language (Barry et al., 1997; Ellis & Morrison, 1998; Snodgrass & Yuditsky, 1996); however, a direct empirical comparison of word frequency across languages is not available.

Word Familiarity

Similarly, word familiarity is thought of as the conceptual parallel to word frequency. Familiarity ratings have been used to determine the extent people have thought about or come in contact with different concepts. Studies examining patients with semantic dementia with an object naming task have implied familiarity with objects influences naming via access to semantic representations (Hirsh & Funnell, 1995; Ralph, Graham, Ellis, & Hodges, 1998). Their argument states that the more familiar a person is with an object, the more likely it will be perceived as that object. Words such as “accordion” “vest” and “tie” have higher familiarity ratings in English than in Spanish, suggesting they are more salient to English-speakers than they are to Spanish-speakers (Cuetos, Ellis, & Alvarez, 1999; Snodgrass & Vanderwart, 1980).

Age of Acquisition

Another potential reason object naming performance differs across languages is due to differences between the age one acquires a word in English versus Spanish. Several studies have found word age of acquisition (AoA) contributes to naming ability in English and Spanish (Barry et al., 1997; Carroll & White, 1973; Cuetos, Ellis, & Alvarez, 1999; Ellis & Morrison, 1998; Gilhooly & Gilhooly, 1979; Morrison et al., 1992; Snodgrass & Yuditsky, 1996). Using a naming reaction time paradigm, these studies have found longer naming response latencies for words acquired later in life as opposed to early-acquired words. One explanatory hypothesis for these findings is that early-acquired words take less time to retrieve because they have more unitary and localized phonological representations, whereas words acquired later have well-distributed representations and require more time to assemble the dispersed parts (Morrison & Ellis, 1995). To illustrate the point that AoA may be different across languages, Snodgrass & Vanderwart (1980) and Cuetos et al. (1999) showed the same set of pictures to an English-speaking and a Spanish-speaking group respectively, and asked them to estimate their age at the time of acquiring the word that is represented in each picture. A comparison of the words "accordion" and "pipe" with respect to their age of acquisition ratings in English and Spanish show that both words are acquired later in Spanish than in English-speakers (Cuetos et al., 1999; Snodgrass & Vanderwart, 1980). This suggests that Spanish-

speakers have more difficulty naming certain words than English-speakers, and thereby possibly rendering translated naming tasks unequal to English naming tests.

Multiple Names for the Same Concept

An additional disadvantage of using an English language naming test translated into Spanish is that some concepts that have one name in English have more than one name in Spanish. However, existing naming tests only accept one Spanish name for each object, and do not accept multiple names for the same object. For example, the English term to describe a 4-wheeled motor vehicle usually propelled by an internal combustion engine is "car" or "automobile," while in Spanish this concept can be referred to as an "automovil," "coche," "carro," and simply "auto" (American Heritage, 2000). This cultural and linguistic difference may contribute to an inaccurate interpretation of Spanish-speakers' true naming ability when using translated naming tasks (Lowenstein, 1995). Furthermore, naming tests that are culturally fair to Spanish-speakers need to be constructed utilizing unambiguously named words.

Texas Naming Test

The development of the Texas Naming Test (TNT) will be guided by the experimental psycholinguistic literature. Within a naming reaction time paradigm, it has been shown that the greatest predictors of naming are AoA, frequency, and familiarity, in that order (Carroll & White, 1973; Cuetos, Ellis, &

Alvarez, 1999; Gilhooly & Gilhooly, 1979; Morrison et al., 1992). This literature shows that naming reaction times are slower with words acquired later in life, used with less frequency, and less familiar. The present study created a test by selecting Spanish words consistent with these findings and therefore are more linguistically appropriate for this population (test development details are presented in procedure section).

The TNT is different from the available naming tests currently used with Spanish-speakers. One difference is that the test consists of items handpicked specifically for Spanish-speakers and not created based on their utility among English-speakers. The manner in which the items were selected and ordered is expected to reduce the linguistic bias often found in verbally loaded neuropsychological tests (Ellis et al., 1980; Harris et al., 1995; Howley, 2004; Loewenstein, 1995; Ponton et al., 1996; Taussig et al., 1992; Valencia et al., 1985). The present study is expected to shed light on the possibly confounding effect of translating a language-loaded test from English to Spanish by comparing the TNT to existing translated naming tests. Results of this study also shed light on the influence linguistic variables such as word familiarity, frequency, and age of acquisition have on Spanish naming ability.

Another difference between existing translated naming tests and the TNT is that the latter will have normative data that approximate that of Spanish-speakers to draw conclusions from, rather than relying on data from English-

speakers. These data may allow researchers and clinicians to interpret test results with greater accuracy and confidence because the test is developed and normed with individuals whose demographic data more closely resemble their Spanish-speaking patients. The TNT provides an alternative to using normative data from an English-speaking sample and interpolating test results for a Spanish-speaker.

The present study will also determine the psychometric properties of the new naming test for Spanish-speakers. Presently, clinicians must use extreme caution when interpreting a Spanish-speaker's low naming score because the reliability and validity of the instruments used with this population are unknown. While norms for the BNT-PS and the SNT do exist, it is unclear if these tests are truly measuring naming ability. The present study will therefore provide construct validity and internal consistency data.

The TNT will also be used to differentiate normal older Hispanic adults from individuals with dementia. This will yield clinical information regarding the naming performance of individuals with and without cognitive impairment, which is useful data for clinicians attempting to identify normal age-related naming difficulties versus the early stages of Alzheimer's disease among Spanish-speakers.

Summary

Dramatic increases in predominantly Spanish-speaking elderly Hispanics in the United States are escalating the need for neuropsychologists to evaluate

these individuals. Many neuropsychologists in the United States find themselves utilizing inadequate assessment methods which render them uncomfortable interpreting the data. Translated tests, the most common stop-gap method used by neuropsychologists, may not assess similar constructs as their respective originals. Tests that assess language ability arguably pose the largest threat to the validity of cross-culture test interpretation, as they are strongly correlated to ethnicity and education. Few neuropsychological tests are developed in Spanish and normed with Spanish-speakers; however, test developers who have done so have shown it is an effective way to create construct-valid tests (Harris, Cullum, & Puente, 1995; Gutierrez, 2002).

Existing Spanish naming tests are translated versions of their English-language originals, and their construct validity with Spanish-speakers is virtually unexamined, therefore making interpretation tenuous. Experimental linguistic research provides data that may prove useful for developing a naming test that limits cultural, linguistic, and educational bias against Spanish-speakers. The present study will develop, validate, and examine the clinical utility of such a test.

Research Goals

The primary goals of this investigation are to:

1) Create a Spanish naming test developed specifically for Spanish-speakers utilizing words selected for their psycholinguistic properties in Spanish.
2) Examine the internal consistency, reliability, and validity of the new test.

3) Examine the effects of acculturation and demographic variables on the new and existing naming tests.
4) Compare rates of classification accuracy for normal older adults and patients with dementia among the new and existing Spanish naming tests.

Hypotheses:

Test Reliability

Hypothesis 1 – Among a sample of normal older adults and demented Spanish-speakers, the TNT will show a moderate to high Cronbach's alpha coefficient suggesting its items reliably assess the construct of interest.

Test Validity

Hypothesis 2 – Among normal and demented Hispanic older adults the TNT will be significantly correlated with the MBNT-S and 15-SNT.

Hypothesis 3 – Among both normal and demented older Hispanic adults, acculturation and education will have moderate to high correlations ($r \geq 0.3$) with the three Spanish naming tests; however, acculturation will correlate least with the TNT.

Hypothesis 4 – The TNT will differentiate individuals with dementia from normal older Hispanic adults.

Hypothesis 5 – The TNT will differentiate individuals with dementia from normal older Hispanic adults with greater sensitivity than the MBNT-S and 15-SNT, respectively.

METHOD

Subjects

A sample of older Spanish-speakers was obtained from the Parkland Memorial Hospital Geriatric Clinic (PGC) and the East Dallas Health Clinic (EDHC). These clinics are Primary Care Clinics for older adult individuals in Dallas, Texas. Approximately 50% of the patients at these clinics speak Spanish as their primary Language. These patients utilize the clinics, and approximately 30%-50% of those patients have some cognitive impairment. The present study consisted of two groups with Hispanic individuals who report Spanish as their primary or only language. Patients in this study hailed from various Latin countries, though the majority were immigrants of Mexico or of Mexican descent (64.7%), and over 50% of the total group have lived in the United States over a quarter of their lives. Additionally, 42% of the participants in the total group reported they were unable to read and write. Each group had undergone clinical evaluations at their respective clinics and has been screened for dementia using a cognitive screening instrument.

One group consisted of 55 nondemented older Hispanic adults 65-years-old or older. This age range was chosen to create a preliminary normative sample that reflects the age range wherein dementia is most common. This group included patients with acute or chronic medical illnesses, as their visits to the clinic were predicated on medical concerns, but patients whose medical

evaluation or whose score on a cognitive screening instrument suggested cognitive decline or an illness that may compromise cognitive functions (i.e. mental retardation, an illness to the central nervous system, head injury, brain tumor, epilepsy, and dementia) were excluded. The second group consisted of 30 Spanish-speaking individuals 65-years and older diagnosed with dementia. This group included only patients who had been identified as demonstrating evidence of cognitive decline during a medical evaluation at the either primary care clinic, and suspected of suffering from dementia by their primary care physician.

Measures

Texas Naming Test (TNT)

The purpose of the present study is to examine the reliability and validity of a new naming test developed using depicted objects that are relevant and familiar to Spanish-speakers. The TNT was created by choosing 70 words from the 260 words studied in English and Spanish by Snodgrass et al. (1980) and Cuetos, Ellis, & Alvarez (1999), respectively. Seventy items were chosen and studied so that the most appropriate words could be selected and included in the final 30-item test. This also provided an opportunity to develop a test with a similar number of items as an existing Spanish naming test. Items were chosen with regard to their unambiguous names and saliency in the Spanish language. Unambiguous words were included in the TNT by utilizing words in which at

least 85% of normal participants in the aforementioned study correctly used the target name. The seventy words that met the above criteria were ordered according to naming difficulty as measured by their age of acquisition (AoA), age at which most Spanish-speakers learn the names of the respective objects, which is included in the Cuetos et al. (1999) word set.

The 70 selected words were placed on an age z-scale with respect to AoA. Three groups of words were created. One group consisted of words at least one standard deviation above the mean, another one standard deviation below the mean, and a third group consisted of words within one standard deviation from the mean.

Following the literature in this area, word frequency ratings, followed by familiarity ratings, were used to determine the order of words within each age of acquisition group. Words with greater frequency were presented prior to less frequent words, and equally frequent words were presented in ascending order with respect to word familiarity (Table 1). Word frequencies were derived from a dictionary of word frequencies of Castilian Spanish (Alameda & Cuetos, 1995). The Spanish dictionary of word frequencies took a sample of written works (novels, print, textbooks, and scientific writings) from the 15-year period between 1978-1993. The sample of works excluded anything translated into Spanish, anything using a particular dialect of Castilian Spanish, children's literature, poetry, and theatre. Their procedure included randomly selecting 606 written

texts from Latin American and Spanish authors that satisfy the above inclusion/exclusion criteria. Familiarity ratings were created by Cuetos et al. (1999) by asking their participants to judge the familiarity of each of the Snodgrass and Vanderwart pictures. They used a five-point rating scale to indicate familiarity (1 = very unfamiliar through 5 = highly familiar). They defined familiarity as the degree to which one thinks about or comes in contact with the depicted object.

Insert Table 1 here

The present study utilized the rigorously designed line-drawn images created and used by Snodgrass et al. (1980) to obtain linguistic data. The creation of these images adhered to the following rules regarding the orientation of the depicted objects outlined by Snodgrass et al. (1980):

1. Animals are depicted in sideways view, with approximately equal numbers facing left and right.

2. Objects whose up-down orientation may vary (e.g., fork, chisel) are depicted with the functional end down.

3. Long, thin objects are oriented at a 45° angle, with approximately equal numbers in the two possible orientations.

4. Objects are depicted as approximately equal size.

The Snodgrass and Vanderwart (1980) images have been made commercially available in digital JPG format. The present study obtained these images and printed them to fit on cardstock paper sized to match the images of other Spanish naming tests.

The present study reduced the pool of 70 items to 30 after determining the 30 most psychometrically reliable items. These items were identified using standard item selection techniques with the full sample of normal older adult and demented Spanish-speakers. The administration of the TNT involved the examiner showing line-drawn objects and asking the participant to name them in a fashion similar to the standard Boston Naming Test. A phonemic cue was given if the examinee responded incorrectly within 20 seconds. If the examiner suspected the examinee could not determine what was depicted, a brief scripted description of how the object is utilized was given (semantic cue). The scores for the TNT are derived by giving a point for every object correctly named spontaneously or with a semantic cue for a total of 30 possible points. Points were not given for a correct response following a phonemic cue.

Modified Boston Naming Test-Spanish

The MBNT-S is a 30-item adaptation of the original 60-item BNT (Ponton et al., 1992). The authors of the MBNT-S used expert judges to choose 30 items among the items on the original BNT according to appropriateness for use with Spanish-speakers. They also reordered the items according to difficulty as they suspected different levels of difficulty for the same word across languages. Administration and scoring for the MBNT-S is similar to that of the original BNT with one point for each correct response for a total of 30 points..

15-Item Spanish Naming Test

The 15-item Spanish Naming Test (15-SNT; Ardila et al., 1994) is also an adaptation of the BNT. The 15-SNT includes six of the items of the original BNT and nine new items. The authors chose to include these new items based on their frequency of use in the Spanish-language. This test is administered similarly to the BNT in that the examiner displays a series of black and white line-drawings to the examinee, and he/she is asked to name the object depicted. However, the scoring for this test is modified, as 3 points are given when items are named correctly, 2 points when correct with a semantic cue, and 1 point if correct with a phonological cue for a total of 45 points. Normative data for the 15-SNT consists of 346 normal subjects 55 years of age and older, and are stratified by age and education (Ardila et al., 1994).

Spanish Mini-Mental State Examination

The Spanish MMSE is a literal translation of the original MMSE and consists of items assessing orientation, memory, attention and concentration, and language. A Spanish MMSE total score is derived by summing the scores for each item. Total scores range from 0 to 30. The Spanish MMSE is strongly correlated with level of education, as it had a larger effect on performance than age, low sensitivity and specificity for participants with less than 4 years of education (50% and 73%, respectively), and greater sensitivity and specificity for individuals with greater than 5 years of education (86% and 86%, respectively) (Ostrosky-Solis et al., 2000). Recent studies have found discrepancies in MMSE scores across cultures and have suggested the most appropriate cutoff score for distinguishing normal individuals from those with dementia is 22/23 (Beamen et al., 2004; Ostrosky-Solis et al., 2000).

Short Acculturation Scale

The 12-item Short Acculturation Scale (SAS; Marin, Sabogal, Marin, Otero-Sabogal, & Perez-Stable, 1987) was used to measure participants' level of acculturation. This instrument defines acculturation as the extent an individual's behavioral preferences with regard to language use, media usage, and social interaction shift from the culture of origin toward the host culture through exposure and contact. The 12-item SAS was developed by reducing a larger set

of 17 items selected from existing acculturation scales (Cuellar et al., 1980; Padilla, 1980; Szapocznik et al., 1978; Triandis et al., 1982), and modifying them to fit with the authors' definition of acculturation. Some items were written in English and others were written in Spanish, but all items were translated and backtranslated to have a SAS available in each language. The test was then given to a relatively large sample of individuals of Hispanic (n = 363) and non-Hispanic descent (n = 228) from various locations across the United States. The SAS items use a likert-scale format that ranges from 1 to 5. Total scores are derived by summing each item score. The final 12 items were selected on the basis of a factor analysis by deleting any items that load strongly on more than one factor.

The SAS showed good factoral validity, as the final 12 items produced three factors among the Hispanic sample and accounted for 67.6% of the total variance: language use (54.5%), preference for electronic and printed media (7%), ethnic preferences for one's acquaintances (6.1%). Similar factor analytic results were observed for the non-Hispanic sample. Reliability analyses show high internal consistency for the 12 items of the SAS (0.92), with fairly high alpha coefficients for each of the three factors (0.90, 0.86, 0.78).

The SAS has been validated against several criterion variables including subjects' own judgment of their level of acculturation, a derived acculturative index, length of residence and arrival in the United States to show convergent

validity. The SAS total score and each factor score was significantly correlated with each of the aforementioned variables. Furthermore, discrimanant validity analyses showed the SAS total score and factor scores can differentiate first and second generation Hispanic Americans, as well as individuals of Hispanic and non-Hispanic origin.

The SAS has shown to be a particularly appealing measure for use in research because of its versatility, as it is not designed for any one cultural subgroup (i.e., Mexican- or Cuban-Americans) as others are (Cuellar, Harris, & Jasso, 1980; Olmedo, Martinez, & Martinez, 1978; Szapocznik, Scopetta, Kurtines, & Aranalde, 1978). The SAS is also relatively unique, as it is significantly related to many sociodemographic variables used to validate other acculturation scales without including these variables in the scale. The SAS was selected over other acculturation measures in part because it has excellent psychometric properties and because of its brevity.

Procedure

Geriatric Clinical Examination

Each patient seen at the Parkland Geriatric Clinic and the East Dallas Health Clinic undergoes a problem-focused evaluation which includes an interview with the patient, a history and physical examination, a review of their medical records, and a brief screening for cognitive problems. Patients who

endorse memory complaints during their initial interview, or when memory impairment is suspected, undergo a clinical mental status examination that includes a brief clinical assessment of attention, orientation, memory, calculation, and naming. Physicians may choose to perform neurological examinations and laboratory and neuroimaging studies if deemed clinically necessary.

A cognitive examination is included in the evaluation when patients report memory difficulties, or when clinicians or caregivers suspect non-age-related cognitive decline. Cognitive examination includes the Spanish MMSE (Folstein, Folstein, & McHugh, 1975; Bird, Canino, Rubio-Stipec, & Shrout, 1987) given by a bilingual clinician. A more thorough dementia work-up may be conducted for individuals whose Spanish MMSE scores fall below 26. Each research patient was either diagnosed as having dementia or deemed nondemented by their physician following these clinical examinations.

Research Evaluation

At the Parkland Geriatric Clinic, the PI was introduced to the Spanish-speaking patients by a nurse prior to or after their routine appointment with their clinic doctor, and participation in the study was solicited at that time. At the East Dallas Health Clinic, patients were evaluated while waiting for their clinic appointment, and during separate voluntary appointments with the PI. Most patients participated immediately following their appointment with their doctor.

Efforts were made to greet all Spanish-speaking patients at both clinics to introduce them to the study and solicit future participation if they were unable to participate the day of their regularly scheduled appointment.

The purpose of the study and the risks and benefits of participating were described to the subjects. They were also told that they may refuse to continue to participate in the study at any time. This information was presented to them verbally and in writing in Spanish. If they chose to participate, they signed an informed consent form (Appendix A). After the participant had given informed consent, their caregiver was asked to leave the examination room for the duration of the examination. In rare instances in which the participant was uncomfortable without their caregiver, the caregiver was allowed to sit silently behind the participant so as to not influence their responses.

Participants were interviewed to determine age, years of formal education, country of origin, length of residency in the United States, and whether they met inclusion criteria (Appendix B). Language preference was assessed by asking the participant what language they felt most comfortable speaking. Non-demented participants were then administered the Spanish MMSE to assure the participant has not experienced a gross decline in cognitive abilities, and demented participants were also administered this instrument to document their impairment. Each participant was then given the three naming tests in the following order:

TNT, MBNT-S, and 15-SNT. These tests followed typical administration procedures, with one exception. Overlapping items among tests were only administered once, and their scores counted toward each test in which they appear. The TNT shares the same administration procedures with the MBNT-S. Participants were assessed primarily by the PI, but tests were also administered by a Spanish-speaking Master's level research assistant who was trained and supervised by the PI.

Tests were scored and checked for accuracy by the PI. Scoring discrepancies were rectified at this time, and correct scores were double-entered into a computer database by the PI to ensure accurate data entry.

RESULTS

Sample Characteristics

Ninety-five subjects were evaluated for inclusion in the study. Of those individuals, seven were excluded based upon neuromedical history. Of those individuals, four had a history of stroke, and one each had a history of traumatic brain injury, pituitary tumor, and an acute medical condition that could alter cognition. Additionally, one individual discontinued the evaluation due to fatigue, and never returned to complete it. Two individuals were excluded due to severe comprehension difficulty that impaired their ability to respond. This resulted in a final sample of 85 subjects.

As expected, the demented group had significantly lower MMSE (M = 12.2, SD = 4.26) scores than the nondemented group (M = 22.84, SD = 3.91). The demented group was also found to be significantly older (M = 77.77, SD = 7.45) and less acculturated (M = 14.97, SD = 4.15) than the nondemented group (M = 72.98, SD = 6.33, and M = 19.05, SD = 6.08, respectively). The demented group was less educated than the nondemented group (Median = 1, Inter-quartile range = 2.25). No differences were found between demented and nondemented groups for gender (56.7% and 65.5% female, respectively), country of origin (66.7% and 63.6% Mexico, respectively), length of residence in the United States (M = 19.7, SD = 24.12, and M = 30.04 and SD = 22.25, respectively), and generation in the United States (86.7% and 81.8% first generation, respectively). The majority of subjects

were Mexican-born (64.7%), while 15.3% were American-born, and 20% were born elsewhere). Table 2 illustrates mean subject characteristics for the two diagnostic groups. Demented individuals for the present study were mildly to moderately impaired as determined by comparing their mean MMSE score to those stratified by age and education in Ostrosky-Solis et al. (2000).

Insert Table 2 here

TNT Item Selection

Internal Consistency

Internal consistency analysis was performed on the group of demented and nondemented participants using all 70 items to determine the final 30 items that comprised the TNT. Nine items with zero variance were excluded from analysis. Cronbach's alpha for the remaining 61 items was 0.926.

Item-Total Correlations

An item – corrected total score correlation was computed for the 61 items with variance to determine the extent each item correlated with the total score for the other 60 items (Table 3). This information was used to select the most informative 30 items to comprise the TNT. Positive item-total correlations were then squared, yielding the percent of the total variance accounted for by the

respective item. The final 30 TNT items were selected according to their respective contribution to the total variance of the test by discarding the 31 items that account for the least amount of variance (r^2) while maintaining a proportionate number of items corresponding to each level of word AoA (younger, intermediate, and older) .

Insert Table 3 here

Item Difficulty

The order of presentation for the final 30 items was determined by examining their respective level of difficulty. Item difficulty was computed by determining the proportion of nondemented subjects who responded correctly to each item. Items with a greater proportion of correct responses were placed prior to items with a lower proportion. Item difficulty for these items ranged from 0.21 to 0.97. The order of the final 30-items in the TNT is illustrated in Table 4.

Insert Table 4 here

Reliability

Internal Consistency

A second Cronbach's alpha was conducted with both the demented and nondemented sample to examine the reliability of the final 30 items selected to comprise the TNT. This analysis showed alpha remained high at 0.923.

Validity

Convergent and Divergent Validity

Pearson correlations were used to compare the TNT with the other Spanish naming tests using the present sample of demented and nondemented participants (Table 5). The TNT was highly correlated with the MBNT-S (r [83] = 0.84, $p < .001$) and the 15-SNT (r [83] = 0.80, $p < .001$), and these two naming tests were also significantly correlated with each other (r [83] = 0.77, $p < .001$).

Insert Table 5 here

Pearson correlations were also used to examine the relationships among the three naming tests and education, acculturation, age, and MMSE score. A zero order correlation showed the TNT was significantly correlated with education (r [83] = .48, $p < .001$), the Short Acculturation Scale (SAS) (r [83] = .41, $p < .001$), age (r [83] = -.38, $p < .001$), and MMSE (r [83] = .72, $p < .001$).

Partial correlations among the three naming tests remained significant after statistically controlling for the variance attributed to education, acculturation, MMSE, and age (r [79] = .68, $p < .001$; r [79] = .67, $p < .001$; r [79] = .62, $p < .001$, respectively).

Dependent correlation coefficient tests (Cohen & Cohen, 1983) were used to determine whether any of the Spanish naming tests showed stronger correlations with education, acculturation, and age than others. There were no significant differences among the correlations for the three naming tests in terms of education or acculturation, as the naming tests with the highest and lowest correlations with education were not significantly different (education t (82) = 1.20, $p = .104$; acculturation t (82) = .411, $p = .341$). The TNT showed a significantly higher correlation with age than the MBNT-S (t (82) = 4.54, $p < .001$) and the 15-SNT (t (82) = 2.05, $p = .022$). (See table 5).

Discriminant Validity

Multivariate analysis of covariance (MANCOVA) was conducted to determine naming differences between the three tests across the two diagnostic groups (nondemented older adults and patients with dementia) with covariates education, acculturation, and age. In the MANCOVA, there was a significant main effect of diagnosis (F (3, 78) = 8.71, $p < .001$), as well as significant covariate effects [education (F (3, 78) = 3.13, $p = .030$), acculturation (F (3, 78) = 2.84, $p = .038$), and age (F (3, 78) = 3.12, $p < .031$)]. In the analysis of

covariance (ANVCOVA) for each naming test separately, the main effect for diagnosis was significant for each naming test [TNT ($\underline{F}$ (1, 85) = 23.52, $p < .001$), MBNT-S ($\underline{F}$ (1, 85) = 20.46, $p < .001$), and 15-SNT ($\underline{F}$ (1, 85) = 13.36, $p < .001$)]. The covariate education was found significant for the TNT ($\underline{F}$ (1, 80) = 4.94, $p = .029$), MBNT-S ($\underline{F}$ (1, 80) = 9.09, $p = .003$) and 15-SNT ($\underline{F}$ (1, 80) = 5.62, $p = .020$). Acculturation was a significant covariate for the MBNT-S ($\underline{F}$ (1, 80) = 4.89, $p = .030$). The covariate age was significant on the TNT ($\underline{F}$ (1, 80) = 6.00, $p = .016$). Covariate adjusted mean scores for the three Spanish naming tests are presented in Table 6.

Insert Table 6 here

Logistic regression was conducted on the collective sample of 85 participants to determine the extent the three individual tests discriminate demented from normal Spanish-speakers. The first regression model examined the contribution of risk-adjusted variables including age, education, gender, and acculturation to the prediction of diagnosis. This model was defined as the base for comparisons with the models that included each naming test separately. Using the conventional significance level of $p > .40$, the Hosmer and Lemeshow (H-L)

Goodness of Fit Test showed this regression model is a good fit to the observed data (H-L χ^2 (7, N = 85) = 5.91, p = .551). The model χ^2 indicated at least one of the risk-adjusted variables was a significant predictor of dementia (model χ^2 (4, N = 85) = 37.66, $p < .001$). Using a conventional significance level of $p < .10$, the Wald statistic, that indicates which of the predictor variables in the regression equation (i.e. the respective risk-adjusted variables) significantly predict the dependent variable (i.e. diagnostic category), resulted in age, education, gender, and acculturation as significant predictors of dementia. Results for this logistic regression model are presented in Table 7.

Insert Table 7 here

Three logistic regression analyses were performed separately for each naming test using all four covariates. The logistic regression model predicting diagnostic group with TNT as one of the predictors fit the observed data well (H-L χ^2 (7, N = 85) = 3.23, p = .863). The TNT was found to provide significant improvement over the base model of covariates (change in χ^2 (1, N = 85) = 15.70, $p < .001$). Only TNT and education were found to be significant predictors of dementia in this model.

The logistic regression model predicting dementia including the MBNT-S was found to fit the observed data well (H-L χ^2 (7, N = 85) = 6.97, p = .432). The MBNT-S was found to provide significant improvement over the risk-adjusted base model (change in χ^2 (1, N = 85) = 22.56, p < .001). All covariates were found to be significant (p < .10).

In the logistic regression model predicting dementia with the 15-SNT as one of the predictors, the model was found to fit the observed data (H-L χ^2 (7, N = 85) = 7.69, p = .361). The 15-SNT was found to provide significant improvement in prediction over the base covariate model (change in χ^2 (1, N = 85) = 11.66, p < .001). In addition, all four covariates were found to be significant predictors of dementia (see Table 8).

Insert Table 8 here

Using the scores for each of the three naming tests in the collective sample of demented and nondemented subjects, receiver operating characteristic (ROC) curves were generated and the area under each curve was examined to determine the ability of each naming test to differentiate between diagnostic groups. The ROC curves are presented in Figure 1. The results showed that the TNT had the highest area under the curve compared to the other two naming tests (TNT =

0.895, MBNT-S = 0.878, and 15-SNT = 0.814, respectively). When compared using a Z-test, the TNT had a significantly greater area under the curve than the 15-SNT ($Z = 2.17$, $p < .05$), though the comparison with the MBNT-S was nonsignificant ($Z = 0.60$, $p > .05$).

ROC analysis was also used to select an optimal score for each naming test to determine the test with the greatest sensitivity. Cut scores for each test were selected by determining the scores with the greatest area under the curve (TNT = 0.788; MBNT-S = 0.771; 15-SNT = 0.742). For the TNT, a cut score of 23 was found to have sensitivity of 100% and specificity of 63.6%. The positive and negative predictive values for this cut score were 60% and 100%, respectively, with overall accuracy of 76.5%. A cut score of 12 for the MBNT-S had a sensitivity of 60% and specificity of 94.5%. Positive and negative predictive values were 85% and 81%, respectively. For the 15-SNT, an optimum cut score of 37 had sensitivity of 86.7%, with specificity of 61.8%. Positive and negative predictive values were also relatively lower for the 15-SNT (55.3%, and 89.5%, respectively). Classification accuracy for the optimal cut points of the three Spanish naming tests are presented in Table 9.

Insert Table 9 here

DISCUSSION

Naming impairment is one of the more common deficits found in cortical dementias (Bayles, & Tomoeda, 1983; Frank, McDade, & Scott, 1996; Lichtenberg, Vangel, Kimbarow, & Ross, 1996); however, it is sometimes difficult to assess in individuals with limited education and of different cultures (Allegri et al., 1997; Heaton, Miller, Taylor, & Grant, 2004; Lichtenberg, Ross, & Christensen, 1994; Loewenstein, 1995; Kaplan, Goodglass, & Weintraub, 1983; Ponton et al., 1996; Ross & Lichtenberg, 1998; La Barge, Edward, & Knesevich, 1986; Taussig et al., 1992; Van Gorp, Satz, Kiersch, & Henry, 1986). Current neuropsychological testing with Spanish-speakers generally utilizes assessment instruments that have been developed with English-speakers and later translated into Spanish. This practice may decrease the construct validity of these instruments, as one cannot be certain that translated Spanish tests are equivalent to the original English tests (Ellis & Hennelly, 1980; Gutierrez, 2002; Lowenstein, 1995; Valencia & Rankin, 1985). The present study sought out to develop a naming test in Spanish for use as an alternative to English naming tests that have been translated into Spanish in demented and nondemented individuals. Psycholinguistic variables including Spanish word frequency, AOA, and familiarity were utilized to to select culture appropriate words for the development of the first naming test comprised of Spanish-relevant items. Internal consistency, and convergent, divergent, and discriminant validities for the

new naming measure, the Texas Naming Test (TNT), were examined, and its discriminant utility was compared to translated Spanish naming tests.

Internal Consistency of TNT

Hypothesis 1: Among a sample of normal older adults and demented Spanish-speakers, the TNT will show a moderate to high internal consistency.

This hypothesis was supported. The 30 items that comprise the TNT showed a high internal reliability coefficient (alpha = 0.923), suggesting the items of this test reliably measure the same construct. The degree of interrelatedness is not surprising, as the items were selected according to their published normative data with respect to naming accuracy among nondemented Spanish-speaking adults (Cuetos, et al., 1999). As discussed previously, only unambiguous words were included in the development of the TNT by selecting words from Cuetos et al. (1999) in which at least 85% of participants in this study correctly used the target name. Every item included in the TNT is positively correlated with the total score for the scale, and contributes positively to Cronbach's alpha for the total score. It is unknown how the TNT's internal consistency compares to that of other Spanish naming tests, as there are currently no known published reports of this. However, given the stringent empirical criteria by which items were selected for inclusion in the test, it is not surprising that the TNT has such high internal consistency.

Cronbach's alpha for the TNT in the present study was slightly higher than the short forms of the BNT published in primarily Caucasian samples. For example, Graves et al. (2004) found a 15-item short form of the BNT demonstrated an alpha of 0.84 among young Caucasians, and Fastenau et al. (1998) reported alpha values for six short forms of the BNT ranged from 0.37 to 0.75 in normal Caucasians. Cheung et al. (2004) selected 30 items from the standard 60 item BNT, assigned a Cantonese name as the target response, and administered this test to young, educated brain-damaged and normal controls from China. Examination of this Chinese version of the BNT found internal consistency was satisfactory at 0.83 (Cheung et al., 2004).

While alpha for the TNT was greater than the above mentioned short forms, it was similar to a 30-item short form of the BNT (alpha = 0.90) which was derived using a statistical procedure to identify items that maintain high reliability (item response theory; Graves et al., 2004). Though there are many differences between the samples used in the present study and that of Graves et al. (2004), (i.e., the former was older, less educated, and spoke only Spanish) it is possible that their short-form version of the BNT and the TNT have comparably high internal consistency because of the careful manner in which the test items were selected. Both of these studies used theory and statistical criteria to select items, whereas other 30- and 15-item versions of the BNT selected items by splitting the 60-item BNT in half or fourths. These results suggest statistically and

theoretically based methods of selecting test items may improve the construct validity of such naming tests.

Construct Validity

Convergent Validity

Hypothesis 2: Among normal and demented Hispanic older adults the TNT will be significantly correlated with the MBNT-S and 15-SNT.

This hypothesis was supported. The results showed that performances on the TNT were positively correlated with performances on both the MBNT-S and the 15-SNT, such that individuals who did well on the TNT also did well on the other two tests, and vice versa. This finding suggests the TNT has convergent validity, as it measures something very similar to what existing naming tests measure. To date, there are no known published studies correlating the MBNT-S and the 15-SNT with each other, though all three naming tests were expected to correlate highly, as they utilized similar line-drawings and administration procedures.

As expected, the TNT had a relatively greater correlation with the MBNT-S ($r = .84$) than with the 15-SNT ($r = 0.80$) due to the length of the respective tests, and similarities in scoring. Both the MBNT-S and TNT have 30 items, whereas the 15-SNT only has 15 items. A larger number of items may allow for a more thorough assessment of naming ability at each increment of item difficulty.

Furthermore, the smaller number of items for the 15-SNT may attenuate the range of scores for the other two tests to correlate with.

Although each Spanish naming test is scored differently, there is greater similarity between the TNT and the MBNT-S than with the 15-SNT, as a correct response for the two latter tests consists of a response matching the target word spontaneously or with a semantic cue. However, the 15-SNT awards credit for a correct response after phonemic cues. This may influence the test results by artificially inflating naming scores, as the task is simplified by giving credit to a correct response after a phonemic cue. This scoring scheme renders the 15-SNT slightly easier than its counterparts, and its ability to tap into naming may be diluted as compared to the TNT and MBNT-S (i.e., confounds semantic and phonemic access to words).

Divergent Validity

Hypothesis 3: Among both normal and demented older Hispanic adults, education and acculturation will have moderate to high correlations ($r \geq 0.3$) with the three Spanish naming tests; however, acculturation will correlate least with the TNT.

This hypothesis was partially supported. Correlation analyses showed education shared a moderate and significant correlation with TNT, MBNT-S, and 15-SNT among the sample of both demented and nondemented subjects. Similarly, level of acculturation was found to be significantly correlated with

performance on all three naming tests, as individuals who scored lower on the naming tests were reported to be less acculturated as measured by the SAS. The TNT was predicted to have the lowest correlation with education and acculturation given that its items were selected in part with respect to saliency for Spanish-speakers and not merely translated from English into Spanish; thus, the lack of significant differences among the correlations of these naming tests and the aforementioned variables is surprising.

The TNT's correlation with education despite attempts to reduce educational influence by selecting only the most frequent correctly identified words in the Cuetos (1999) word set, may be due to the inherent relationship between education and confrontation naming tasks. It has been demonstrated that items on naming tasks require a certain degree of educational exposure to elicit a correct response; however, at higher levels of education, the influence of education may be reduced and naming tasks may then assess true word retrieval ability and not educational exposure. This hypothesis is partially supported by most studies of the BNT, as they have found naming performance is highly correlated with education in poorly educated but not highly educated individuals (Kaplan et al., 1983; La Barge, et al., 1986; Loewenstein et al., 1995; Van Gorp et al., 1986).

It is possible that the TNT's correlation with education is also due in part to the differences between the sample used to obtain age of acquisition and word

frequency data for the Snodgrass & Vanderwart images (Cuetos et al., 1999) and the sample in the present study. All of the individuals in Cuetos et al. (1999) had at least 12 years of education, whereas the median amount of education in the present study was 3 years. The fact that TNT items were selected based on the frequency of use and AoA in highly educated individuals likely makes the test more difficult for less educated counterparts, given the items may be less salient or familiar to them. The TNT's significant correlation with education suggests the method used to select items for the test did not successfully reduce the influence of education commonly associated with naming tests.

In terms of acculturation, it is unlikely the demented and nondemented samples are differentially acculturated as both groups come from virtually the same population (i.e., of Mexican descent, equivalent amount of time residing in the United States, and evaluated in Dallas primary care clinics). It is more likely that the SAS did not adequately measure adaptation to the host culture as was expected, which resulted in a restricted range of acculturation scores. The SAS, being a self-report measure with a likert-scale format, may have been difficult for cognitively impaired patients in the present study. Evidence for this conjecture was found by examining mean acculturation scores for demented and nondemented groups and finding they were significantly different, and had distinct response distributions. The distribution of responses on the SAS among demented individuals was highly skewed, as the range was 19 points, but the

score at the third quartile was within 3.5 points of the lowest possible score. In contrast, SAS responses for the nondemented group had a range of 25 points and the score at the third quartile was 11 points above the lowest possible score. This suggests the SAS is not an optimal instrument to measure acculturation in a poorly educated and cognitively impaired population.

Interestingly, age was significantly correlated with all three naming tests; however, TNT had a significantly stronger correlation with age than the MBNT-S and 15-SNT. It is not surprising that the TNT has a greater correlation with age than the other naming tests given confrontation naming tests are typically correlated with age (Albert, Heller, & Milberg, 1988; Au, Jong, Nicholas, Obler, Kass & Albert, 1995) and that item selection for the TNT was based partly on age of acquisition, an age related variable known to be negatively correlated with naming reaction time. In contrast, the translated Spanish naming tests were not created with age-related variables and subsequently are not as sensitive to age related naming decline. To illustrate this point, a sub-analysis showed the oldest quartile of the sample ($\geq$ 79 years of age) had significantly lower TNT scores than younger participants $t(83) = 3.19$, $p = .002$. However, the oldest participants did not have significantly lower scores on the MBNT-S $t(83) = 1.98$, $p = .051$, and had marginally significant scores on the 15-SNT $t(83) = 2.04$, $p = .044$.

Correcting for Demographic Variables

Mean differences were found between demented and nondemented individuals among the Spanish naming tests; however, covariate analyses showed demographic differences between the two groups contribute to differential performance. Multivariate analysis of covariance supported the notion that performances on all three Spanish naming tests were influenced by education. This is especially important for tests used with poorly educated populations to avoid, as the test should measure a specific ability rather than simply reflect level of education. None of the Spanish naming tests has an advantage over the others when used with less educated patients, because they are all equally influenced by education. The MANCOVA analyses also demonstrated that acculturation influenced mean scores on the MBNT-S, but not the TNT or the 15-SNT. This suggests that although there is a strong correlation between acculturation and TNT, the relationship did not have a direct effect on the mean scores of this test. This may be due to the minimal variance found in SAS scores for the sample in the present study.

Note that acculturation did not influence mean scores on the 15-SNT either. This is slightly surprising given that it was a translation of the English BNT, but there are two possible explanations for this finding. One explanation is that developers of these tests reduced the impact of culture on their tests by carefully selecting their items. The TNT and 15-SNT were not mere translations

of the BNT, as developers of the TNT selected original items based on psycholinguistic data, and developers of the 15-SNT included only six of the original 60 BNT words and nine new word items chosen with respect to their frequency of use in the Spanish language. Therefore, it is possible that item selection may have played a role in reducing the impact of culture on naming scores for the TNT and 15-SNT.

It is also possible that the 15-SNT did not correlate with acculturation, whereas the TNT and MBNT-S did, because the former had easier items, which in turn reduced the influence of culture. A secondary analysis of responses across the three naming tests demonstrated that many more items on the 15-SNT were correct than items for the others, rendering it an easier test. For example, the median 15-SNT score corresponded to 71.1% of the maximum score for the test. Whereas, the median scores for the TNT and MBNT-S corresponded to 51.7% and 38.3% of the maximum scores, respectively. Furthermore, 13.3% of the demented subjects scored above the nondemented 15-SNT mean score; whereas none of the demented patients scored above the nondemented mean score for either the TNT or MBNT-S. Simply put, the items on the 15-SNT are so simple that patients responded correctly to nearly three fourths of the items regardless of diagnosis. The restricted range that resulted from the relatively easier items of the 15-SNT may have contributed to its minimal correlation with acculturation.

In sharp contrast, the developers of the 15-SNT may have successfully reduced the impact of culture on the test and thusly rendered it less correlated to acculturation measures. The 15-SNT, though an adaptation of the original BNT, was developed in Columbia and included 9 new words chosen with respect to their frequency of use in the Spanish language. Therefore, the development of the 15-SNT at least attempted to incorporate words/items that are salient in the Latin American culture, whereas the MBNT-S did not. Surprisingly, as explained above, the TNT did not show the lowest correlation with acculturation despite the data-driven manner in which the entire test was developed; however, the impact of acculturation on the naming performances in this sample was greatest for the MBNT-S which was developed with English-speakers and later translated into Spanish. This is indirect evidence that the careful development of naming tests for use in a specific population may reduce cultural bias.

Furthermore, multivariate analysis of covariance also demonstrated additional evidence that age influences performances on the TNT, but did not have an influence on either the MBNT-S or 15-SNT. This is an interesting finding because age was expected to influence all three Spanish naming tests, as confrontation naming is found to decline with normal aging beginning in the seventh decade of life (Albert et al., 1988; Ramsay et al., 1999). Therefore, only the TNT is sensitive to the effects of age on naming ability, while the others are

not. This illustrates a potential advantage of the TNT over the MBNT-S and 15-SNT.

The finding that the three Spanish naming tests were affected by demographic variables prompted the use of age, education, and acculturation as covariates in subsequent analyses. The means presented for the three Spanish naming tests have been adjusted for the variables that influence each respective test (see Table 10).

Insert Table 10 here

Discriminant Validity

Hypothesis 4: The TNT will differentiate individuals with dementia from normal older Hispanic adults.

This hypothesis was supported. Differences between the demented and nondemented groups were detected, as individuals with dementia scored lower than those without dementia on the TNT. These results were expected given that naming impairment is a common symptom in dementia (Bayles, & Tomoeda, 1983; Frank, McDade, & Scott, 1996; Lichtenberg, Vangel, Kimbarow, & Ross, 1996; Testa, Ivnik, Boeve, Petersen, Pankratz, et al., 2004). Additionally, the only known study examining neurocognitive differences between Spanish-

speaking individuals with and without dementia found that those with dementia had significantly worse scores on the translated 60-item BNT than their nondemented counterparts (Taussig et al., 1992).

A logistic regression was used to determine the contribution of the TNT in discriminating demented and nondemented individuals. The risk-adjusted (i.e., demographic) variables were all significant independent predictors of dementia, and the addition of the TNT to the regression model significantly improved the predictive ability of the test. These results suggest that the TNT can discriminate between demented and nondemented individuals reasonably well.

While there is not a single published study with which to compare the TNT's ability to accurately classify Spanish-speaking demented and nondemented individuals on the basis of naming ability, the findings of the present study are consistent with the only study that examined the contribution of a naming test toward the differential diagnosis of demented versus nondemented controls among English-speakers (Testa et al., 2004). Testa and colleagues (2004) examined the utility of the Boston Naming Test (BNT) in determining differences between patients with AD, mild cognitive impairment, and normal controls. Their results showed the three groups were differentiated by their performance on the BNT; however, they noted that differences were most evident only in moderate to severe cases of dementia. The present study's findings are consistent with Testa

et al. (2004) in that the TNT demonstrated reasonable differential utility for detecting differences between demented and nondemented groups.

Hypothesis 5: The TNT will differentiate individuals with dementia from normal older Hispanic adults with greater sensitivity than the MBNT-S and 15-SNT, respectively.

This hypothesis was partially supported. The three Spanish naming tests made significant independent contributions to the accurate prediction of dementia. The risk adjusted variables were all significant independent predictors of dementia, and the addition of each naming test to the regression model significantly improved the predictive ability of the each respective test. The MBNT-S in particular improved its regression model's predictive ability to a relatively greater extent than the other naming tests. Furthermore, examining the classification accuracy for the test scores arbitrarily selected by the logistic regression models for the MBNT-S and 15-SNT showed both tests correctly classified 90.6% and 88.2% of all patients, respectively, whereas the regression model that includes the TNT had an overall classification accuracy of 83.5%. However, the regression models for the former naming tests showed that every risk-adjusted variable remained a significant predictor of dementia, while only education shared predictive value with TNT in its respective model. These results suggest that all three Spanish naming tests were significant independent predictors of dementia at relatively similar rates of accuracy, but the MBNT-S and 15-SNT

require additional demographic information beyond that needed by the TNT. That is, the TNT does not require information regarding a particular patient's age, gender, or level of acculturation to accurately predict membership in either the demented or nondemented group. This is an interesting finding given that the primary investigator set forth to develop a measure that could identify dementia while limiting the influence of culture.

To further investigate the discriminant value of each naming test independent of additional information, ROC analyses demonstrated the TNT had a relatively greater area under the curve compared to its counterparts, though the advantage of the TNT and MBNT-S was minor and not statistically significant. This suggests that in general, the TNT is comparable to the MBNT-S in terms of its ability to discriminate between demented and nondemented Spanish-speaking individuals, and that it is better than the 15-SNT in this regard. It is not surprising that the TNT had significantly greater discriminant ability than the 15-SNT, as the latter test was believed to be overly simple. For example, 10% of the demented patients missed only 1 item on the 15-SNT, whereas, the highest scores on the TNT and MBNT-S were 7 and 13 incorrect items from a perfect score, respectively.

To further explore the differences among the three naming tests, optimal cut points were determined based on their respective ROC curves. Adjusting the cut point for each test allows one to examine their strong suits, as the optimal cut

points were selected based on the scores that had the greatest area under the curve (i.e., the score that best discriminated demented and nondemented patients). Given that the prevalence rate of dementia is greater among Hispanics than African Americans and non-Hispanic whites (Gurland et al., 1999) and that neuropsychologists feel uncomfortable and inadequate about evaluating Spanish-speakers (Enchemendia et al., 1997), the ability of a test to identify cases of dementia (sensitivity), is of greater importance than specificity. Adjusting the cut points to maximize discriminant ability resulted in the TNT having greater sensitivity (100%) than both the MBNT-S (60%) and the 15-SNT (86%), though specificity was greatest for the MBNT-S (94.5%) (TNT 63.6%, 15-SNT 61%). Furthermore, PPV was greater for the MBNT-S (85%) than its counterparts, and was comparable between the TNT (60%) and 15-SNT (55.3%); however, NPV was greatest for the TNT (100%) (MBNT-S 81% and 15-SNT 89.5%). These data suggest that the TNT and MBNT-S have greater ability to discriminate demented and nondemented patients than the 15-SNT, and have comparable discriminant ability despite having different strengths.

The data suggest that the TNT and MBNT-S are better suited for distinct purposes given their strengths in different areas. For instance, with an optimal cut point of 23, the TNT may be a valuable instrument to identify individuals who should be referred for a comprehensive dementia evaluation to clarify diagnosis, as the results suggest that patients with TNT scores at or below this score should

be regarded as potentially being cognitively impaired (sensitivity = 100%). In contrast, a TNT score equal to or greater than 24 was an indication that an individual was not likely cognitively impaired (i.e., NPV = 100%). A cut score of 12 rendered the MBNT-S ill equipped at identifying individuals who might be demented (60%), but provided an advantage over the TNT for identifying individuals who are likely not demented and may not require further evaluation (94.5%).

The TNT was developed in such a manner that emphasized sensitivity over specificity as it was hoped to be useful in geographic areas where dementia is underidentified (i.e., primary care clinics in Texas). Greater rates of sensitivity are of utmost importance for use with older Spanish-speaking populations, as many neuropsychologists feel inadequate and uncomfortable evaluating them because they are unsure of the influence educational and cultural differences have on the patient's presentation (Enchemendia, et al., 1997). Use of a test with high sensitivity, such as the TNT using an optimal cut score, could improve the identification of individuals who need further evaluation to determine whether or not they are truly cognitively impaired. The TNT has demonstrated preliminary success for this purpose, and may be used in conjunction with the MMSE to augment the ability to detect dementia beyond what is currently reported in the literature, as the MMSE has shown poor sensitivity and specificity for Spanish-speakers with 4 years of education (50% sensitivity, 72.7% specificity; Ostrosky-

Solis et al., 2000). In contrast, the MBNT-S has demonstrated greater ability to accurately identify nondemented individuals than the TNT. Although this makes the MBNT-S less useful for identifying dementia in less educated Spanish-speakers at primary care clinics, its strength may be better suited in areas where the prevalence rate of dementia is low and/or the accurate identification of nondemented individuals is paramount.

It is possible the optimal cut point for the TNT is more sensitive than the optimal cut point for the MBNT-S because the items of the TNT are more culturally salient for Spanish-speakers, as the items were selected based upon the relevance of the items in the Spanish language. This may account for the finding that culture played a minimal role in predicting dementia when using the TNT, whereas culture significantly influenced performance on the MBNT-S. Given that the MBNT-S was translated from English to Spanish, cultural aspects of the English-speaking sample used to develop the 30-item BNT may be embedded in the items, and these cultural aspects may confound dementia diagnosis. To illustrate this confound, both the TNT and MBNT-S were correlated with education, but only the MBNT-S scores were influenced by level of acculturation. Furthermore, the MBNT-S requires the influence of acculturation data to strengthen its ability to predict dementia, while the TNT does not. These data suggest that although the TNT is related to acculturation, culture does not influence test scores. Additionally, the development of the TNT used age of

acquisition data to select the items in the test, and all items selected were on average acquired prior to age 7 years. Therefore, it is reasonable to assume these words are culturally relevant/familiar to Spanish-speakers. These data suggest the development of the TNT with salient items for Spanish-speakers may have contributed to its relatively high level of sensitivity using the optimal cut point.

The classification accuracy findings in the present study are consistent with the only known study that examined the discriminant utility of the BNT in individuals with AD and nondemented controls (Testa et al., 2004). In that study, the BNT alone achieved lower sensitivity (62.8%), higher specificity (82.7%), and a comparable overall hit rate (73%) to the TNT. However, the current investigation is very different from Testa et al. (2004), as the current study utilized individuals who were significantly less educated and more cognitively impaired, which may limit the comparability between studies.

Due to the lack of research examining the differential utility of naming tests (especially Spanish naming tests), the present results must be put into the larger context of differential performance among other neuropsychological instruments. However, comparisons between present results and those from other investigations is limited given the different instruments used, cognitive domains assessed, and samples examined. With that caveat, the area under the ROC curve was slightly, though not significantly, larger for the TNT than the other Spanish naming tests, and was found to be equivalent or greater than what can be seen for

the MMSE or other neuropsychological measures when differentiating demented and nondemented groups (Bustamante et al., 2003; Kuslansky et al., 2004; Rascovsky, Salmon, Ho, Galasko, Peavy et al., 2002; Storey, Rowland, Basic, & Conforti, 2002; Wind et al., 1997). For example, Bustamante et al. (2003) found a logistic regression model including the MMSE and a measure of a caregiver's report of patient functioning could differentiate mild to moderate dementia with 86.7% sensitivity and 95.7% specificity, while the classification accuracy for the MMSE alone was 83.3% sensitivity and 97.8% specificity. Furthermore, Wind et al. (1997) examined 533 elderly patients with and without dementia and found the MMSE was able to detect dementia at a rate of 64.8%, and was able to accurately identify the absence of dementia in 93.3% of the cases. Sensitivity for the TNT using the optimal cutoff score (100%) is greater than that of the MMSE in this investigation; however, the MMSE was significantly better at identifying individuals who are not likely to have dementia. This comparison, limited as it is due to differences among the samples (i.e., English versus. Spanish, educated versus uneducated), suggests it can be used to aid in the detection of cognitive impairment in relatively uneducated Spanish-speakers.

Storey et al. (2002) examined different methods of scoring the Clock Drawing test among 49 demented and 44 nondemented multicultural patients. They reported the areas under the ROC curve ranged from 0.60 to 0.72, and all six methods had adequate sensitivity ranging from 78% to 90%; however, specificity

was extremely low, ranging from 16%-58%. These results also suggest the absolute discrimant ability of the TNT is at least equivalent to other commonly used neuropsychological measures and dementia screening instruments. Additionally, Kuslanky et al. (2004), reported an area under the curve using the HVLT equivalent to that of the TNT (0.89), which is considered a good level of overall discriminant ability (Tape, 2003). This provides evidence for the notion that the TNT has adequate differential ability when held up to the same statistical standards of other neuropsychological measures, albeit they are testing two different cognitive domains. In other words, the TNT is at least as sensitive to dementia as other neuropsychological measures.

It is slightly surprising that the TNT has comparable classification accuracy to the MMSE and other brief neuropsychological tests, as the latter instruments are typically used in the clinical evaluation and diagnosis of dementia because they are very sensitive to cognitive impairment (Anthony, LeResche, Niaz, Von Korff, & Folstein, 1982; Arnold et al., 1998; Galasko et al., 1990; Lichtenberg, Ross, Youngblade, & Vangel, 1998; Ostrosky-Solis et al., 2000; Storey et al., 2002; Tierney, Szalai, Dunn, Geslani, and McDowell, 2000), whereas naming tests are not typically seen as screening measures for dementia because while dysnomia is a common feature in the early stages of neurodegenerative illnesses it is not a hallmark. The most likely reason for finding the TNT's classification accuracy is at least on par with commonly used

neuropsychological measures is that most of the previously mentioned studies utilized mildly demented individuals, whereas the demented individuals in the present investigation considerably more impaired. It is understood that the neuropathology in the early stages of cortical dementias typically affects the hippocampus and later progresses to other cortical areas (Zola & Squire, 2000), and that naming impairments though common are not prominent in the early stages of dementia (Bayles & Tomoeda, 1983). Functionally, this progression typically degrades memory prior to affecting naming ability. Because the demented participants in the present study as a whole were mildly to moderately impaired, the progression of their dementia may now be affecting their naming ability in addition to memory. This may result in naming dysfunction playing a bigger role in their clinical presentation than if the patients were only mildly impaired. Subsequently, the greater naming impairment in the demented group raises the sensitivity of the naming tests. In contrast, the onset of dementia for mildly impaired patients used in previous studies is more recent and the progression is less advanced, which subsequently decreases the sensitivity of the neurocognitive measures. Nevertheless, the classification accuracy statistics reported in the present study, when compared to the classification accuracy of the aforementioned neurocognitive measures, suggest the Spanish naming tests (especially the TNT and MBNT-S) can differentiate mildly to moderately

demented Spanish-speaking individuals from their nondemented counterparts at a "good" level (Tape, 2003).

Limitations

One limitation is that this study used the same sample to create the predictive model as it did to predict diagnosis. This may inflate the predictive utility of the test, as one does not know if the test can predict the presence of dementia in an unrelated group of patients. This could be addressed in future investigations by studying the response of an independent sample of demented and nondemented patients.

Another limitation of the present study is that the use of TNT is currently limited to less acculturated and educated Spanish-speakers. It is not known how more acculturated balanced bilinguals perform on the TNT, and it is advised that interpretation of TNT scores for these individuals should be done with caution. However, currently poorly educated and less acculturated Spanish-speakers comprise the majority of Latino patients in the southern border states in the United States which lends external validity (i.e., generalizability) to the current investigation. Furthermore, it is thought that the SAS is not an optimal measure of acculturation due to its five point likert scale format. The data suggest that many of the demented individuals had significant difficulty understanding the response options for the 12 items on the scale. Future studies of cognitively

impaired Spanish-speakers should consider a less cognitively challenging acculturation measure (i.e., three point likert scale or dichotomous responses).

Given the demented sample in the present study was comprised of patients with mild to moderate dementia, the sensitivity of the TNT with milder cases of dementia is relatively unknown. This is a major limitation as it is possible that many cognitive tests can detect differences between the demented and nondemented groups in this investigation given the very high level of cognitive impairment in the demented group.

Because memory impairment, not dysnomia, is the primary deficit in dementia, the specificity of the TNT may improve with the addition of a measure of general cognitive ability such as the MMSE as a co-predictor in a logistic regression model, because the MMSE includes a memory component. However, the present study was precluded from using the MMSE as a predictor in the regression models, as it was used in the clinical diagnosis of each patient. Future exploration of this topic may find it beneficial to use a measure of overall cognitive functioning such as the MMSE or DRS that was not used in the diagnosis of the subjects in the investigation to determine the classification accuracy of the TNT when accompanied by additional cognitive information.

Another limitation of the present study is that the demented participants were not homogenous such that the demented sample included individuals who might have had Alzheimer's disease, vascular dementia, frontotemporal dementia,

etc.. The majority of the studies in this literature examine discriminant validity using a homogenous sample because it reduces the within-group variance attributed to the cognitive deficits typically associated with a heterogeneous dementia sample. Future studies of the TNT should consider restricting inclusion into the investigation to a specific dementia type. Restricting the demented group to include only patients with AD will likely increase the classification accuracy of the TNT, as confrontation naming impairment is a common deficit in patients with AD (Bayles & Tomoeda, 1983).

Future Directions

It is recommended that additional research on the TNT be conducted with a larger sample size of mildly demented patients, as this would be more clinically useful to physicians in primary care clinics serving older Spanish-speakers. It is necessary to examine mildly demented individuals to determine with greater certainty whether the TNT is capable of adequately detecting mild dementia. Furthermore, neuropsychologists are urged to construct assessment instruments in Spanish for use with Spanish-speakers, as they may have greater sensitivity than translated tests, among demented and nondemented Spanish-speaking patients.

For cross-cultural test development, more information is needed about psycholinguistic variables such as word AoA, frequency, and familiarity. While the results did not show a statistical difference between areas under the ROC curve for the TNT and MBNT-S, the two tests performed quite differently using

their optimal cut points. Additionally, the two tests were differentially influenced by culture. Further exploration of the TNT is warranted to determine the extent culturally salient items (i.e., items that are not translated and items selected using psycholinguistic variables) contribute to greater sensitivity for dementia among Spanish-speakers.

Given that the participants in the present study had extremely low levels of education and were not very acculturated, it is advised that future research examine how well the TNT discriminates demented and nondemented patients among more educated and better- acculturated Spanish-speakers. It is also recommended that the utility of the TNT be examined in different Latin countries to determine whether the utility observed in the present study is culture/country specific.

A useful future goal of research is the development of alternate forms of the TNT for the purpose of repeat testing. The current study was unable to create two equivalent 30-item naming tests, given that only 59 of the 61 potential items had positive corrected item-total correlations which was a prerequisite before the items could be considered for inclusion into the final instrument. However, future study on this topic is advised to determine whether two 15-item Spanish naming tests can be developed.

Conclusions

This study developed a confrontation naming test for Spanish-speakers using culturally salient words and demonstrated its internal consistency and construct validity. The TNT demonstrated good convergent validity as it correlated highly with existing translated Spanish-naming tests used in clinical practice. Performance on the TNT was not significantly influenced by acculturation, though it was related to both education and acculturation. The TNT effectively detected differences between demented and nondemented individuals, and demonstrated a high level of sensitivity for dementia. Furthermore, the overall discriminant utility of the test is at least comparable to its counterpart (MBNT-S). Data from this investigation suggests the TNT may be clinically useful where dementia among Spanish-speakers is underidentified. Additionally, this study suggests further exploration is needed to fully understand the impact of culturally salient words on confrontation naming.

Table 1

Words of the Texas Naming Test by Age of Acquisition.

Early Age of Acquisition Words (Range = 2.9 – 3.5 years)							
Spanish	English	Spanish	English	Spanish	English		
puerta	door	taza	cup	payaso	clown		
perro	dog	gallina	chicken	pato	duck		
gato	cat	manzana	apple	platano	banana		
vaso	glass	tenedor	fork				
Middle Age of Acquisition Words (3.6 – 5.1 years)							
Spanish	English	Spanish	English	Spanish	English	Spanish	English
libro	book	lampara	lamp	pera	pear	oveja	sheep
iglesia	church	autobus	bus	peine	comb	cereza	cherry
caballo	horse	corona	crown	cenicero	ashtray	escoba	broom
vestido	dress	anillo	ring	conejo	rabbit	bota	boot
reloj	watch	bolso	pocketbook	cepillo	brush	sarten	frying pan
escalera	ladder	guitarra	guitar	martillo	hammer	pinguino	penguin
botella	bottle	cometa	kite	flecha	arrow	pina	pineapple
arbol	tree	cerdo	pig	cesta	basket	helicoptero	helicopter
llave	key	vaca	cow	hacha	axe	canguro	kangaroo
falda	skirt	guante	glove	tigre	tiger	patin	roller skate
regla	ruler	caracol	snail	plancha	iron	salero	saltshaker
leon	lion	tambor	drum	tomate	tomato		
Late Age of Acquisition Words (5.1 – 6.3 years)							
Spanish	English	Spanish	English				
sobre	envelope	foca	seal				
corbata	tie	trompeta	trumpet				
pipa	pipe	acordeon	accordion				
chaleco	vest	raqueta	tennis racket				
ancla	anchor	rinoceronte	rhinoceros				
cisne	swan	dedal	thimble				

Note. Words are ordered with respect to age of acquisition and word frequency.

Table 2

Sample Characteristics

	Nondemented n = 55		Demented N = 30			
Variables	Mean	SD	Mean	SD	Statistic	P
Age (yrs)	72.98	6.33	77.77	7.45	$t(83) = -3.13$	0.002
Education (yrs)*	5.00	6.00	1.00	2.25	$U = 384.5$	< 0.001
Acculturation	19.05	6.08	14.97	4.15	$t(78.755) = 3.66$	< 0.001
MMSE	22.84	3.91	12.20	4.26	$t(83) = 11.62$	< 0.001
Length of residence (yrs)	30.04	22.25	19.70	24.12	$t(83) = 1.987$	0.500
Gender (% female)	65.5%		56.7%		χ^2 (1, $N = 85$) = 6.39	0.424
Origin (% Mexico)**	63.6%		66.7%		χ^2 (2, $N = 85$) = .144	0.930
Generation (% 1st)	81.8%		86.7%		χ^2 (1, $N = 85$) = .332	0.565

Note. Age, education Mini-Mental State Examination (MMSE) scores, acculturation scores, length of residence in the United States, gender, country of origin, and generation in the United States for each diagnostic group are provided. n = Sample size. SD = standard deviations. * Median and inter-quartile range provided. ** Countries were grouped into the three most frequent categories: United States, Mexico, Other.

Table 3

Internal Consistency Analysis for Potential Texas Naming Test Items

Item Number	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Item Number	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted	Item Number	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1Y	0.571	0.924	27	0.144	0.927	52	0.186	0.927
4	0.473	0.925	28	0.480	0.925	53	0.598	0.923
5	-0.022	0.927	30	0.427	0.925	54	0.251	0.926
6	-0.135	0.927	32	0.262	0.926	55	0.545	0.924
7	0.385	0.926	33	0.307	0.926	56	0.561	0.924
8	0.342	0.926	34	0.491	0.924	57	0.541	0.924
9	0.633	0.923	35	0.453	0.925	58O	0.335	0.926
10	0.084	0.927	36	0.342	0.926	59	0.361	0.925
12M	0.574	0.924	37	0.335	0.926	60	0.317	0.926
13	0.140	0.927	38	0.601	0.923	61	0.361	0.926
14	0.321	0.926	39	0.270	0.926	62	0.455	0.925
15	0.117	0.926	40	0.422	0.925	63	0.558	0.924
16	0.139	0.926	42	0.590	0.924	64	0.503	0.925
18	0.111	0.927	43	0.206	0.926	65	0.514	0.924
19	0.375	0.925	45	0.461	0.925	66	0.438	0.925
21	0.331	0.926	46	0.569	0.924	67	0.587	0.924
22	0.441	0.925	47	0.555	0.924	68	0.530	0.924
23	0.491	0.924	48	0.414	0.925	69	0.470	0.925
24	0.330	0.926	49	0.371	0.925	70	0.412	0.925
25	0.599	0.924	50	0.384	0.926			
26	0.551	0.924	51	0.364	0.925			

Note. Item-Total statistics for potential Texas Naming Test (TNT) items. Nine potential items were not included due to zero variance. Y = Young. M = Middle. O = Old. Cronbach's Alpha for 61 items was .926. Items 2, 3, 11, 17, 20, 29, 31, 41, and 44 were excluded due to lack of variance in responses.

Table 4

Item Difficulty and Internal Consistency for the 30-Item Texas Naming Test

Original Item Number	Group	Item Difficulty for Nondemented Patients	Internal Consistency for Demented and Nondemented Groups	
			Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
4	Y	0.97	.45	.921
28	M	0.93	.48	.921
46	M	0.92	.57	.920
35	M	0.92	.47	.921
1	Y	0.91	.48	.921
9	Y	0.88	.63	.919
12	M	0.88	.54	.920
40	M	0.87	.39	.922
26	M	0.86	.54	.920
23	M	0.84	.51	.920
25	M	0.79	.58	.919
45	M	0.79	.48	.921
62	O	0.78	.39	.922
67	O	0.74	.61	.920
55	M	0.74	.58	.919
34	M	0.73	.47	.921
66	O	0.72	.41	.922
47	M	0.69	.59	.919
57	M	0.69	.60	.919
42	M	0.68	.58	.919
38	M	0.65	.59	.919
30	M	0.61	.46	.922
22	M	0.62	.43	.922
53	M	0.60	.61	.919
56	M	0.58	.54	.920
63	O	0.48	.58	.920
68	O	0.48	.57	.920
65	O	0.48	.52	.920
69	O	0.32	.48	.921
64	O	0.21	.49	.921

Note. Items are presented in order of increasing difficulty. AoA = Age of Acquisition. Y = Young. M = Middle. O = Old. Cronbach's Alpha = 0.923.

Table 5

Correlations Among Variables

Zero Order Correlations

	TNT	MBNT-S	15-SNT	Age	Education	Acculturation
MBNT-S	**0.84**					
15-SNT	**0.80**	**0.77**				
Age	**-0.38**	**-0.22**	**-0.25**			
Education	**0.48**	**0.54**	**0.44**	-0.11		
Acculturation	**0.41**	**0.45**	**0.26**	-0.11	**0.40**	
MMSE	**0.72**	**0.75**	**0.60**	**-0.36**	**0.56**	**0.43**

Age, Education, Acculturation, and MMSE-Adjusted Correlations

	TNT	MBNT-S
MBNT-S	**0.68**	
15-SNT	**0.67**	**0.62**

Note. Zero-order and partial correlations among naming tests and demographic information. Texas Naming Test (TNT), Modified Boston Naming Test-Spanish (MBNT-S), 15-item Spanish Naming Test (15-SNT), Mini-Mental Status Exam (MMSE). Correlation coefficients in bold have $p < .05$.

Table 6

Naming Differences Between Diagnostic Groups

	Nondemented n = 55		Demented n = 30		Main Effect for Diagnostic Group		
Variables	Mean	SE	Mean	SE	F	df	p-value
TNT	23.79	0.71	16.89	1.01	27.28	1	< .001
MBNT-S	17.18	0.49	12.81	0.69	23.95	1	< .001
15-SNT	37.54	0.61	32.85	0.85	18.33	1	< .001

Note. Age and education adjusted group mean scores for the Texas Naming Test (TNT), education and acculturation adjusted mean scores for the Modified Boston Naming Test-Spanish (MBNT-S), and education adjusted mean scores for the 15-Item Spanish Naming Test (15-SNT). n = Sample size. SE = standard error.

Table 7

Base Logistic Regression Model with Covariates as Predictors of Dementia

							95% CI	
	B	S.E.	Wald	df	p-value	Exp(B)	Lower	Upper
Risk-Adjusted Variables – Model χ^2 (4, N = 85) = 37.66, p < .001)								
AGE*	0.14	0.05	8.05	1	0.005	1.15	1.04	1.27
EDUCATION*	-0.38	0.12	10.09	1	0.001	0.68	0.54	0.86
GENDER*	1.20	0.66	3.28	1	0.070	3.31	0.91	12.11
ACCULTURATION*	-0.80	0.08	5.53	1	0.019	0.84	0.72	0.97

Note. Analysis of the contributions made by demographic information as risk adjusted variables.

Demented group size = 30. Nondemented group size = 55. * p < .10.

Table 8

Regression Models Using Tests and Covariates as Predictors of Dementia

							95% CI	
	B	S.E.	Wald	df	p-value	Exp(B)	Lower	Upper
TNT and Risk-Adjusted Variables – Model χ^2 (5, N = 85) = 53.36, p < .001								
TNT*	-0.25	0.08	11.20	1	0.001	0.78	0.67	0.91
AGE	0.08	0.05	2.34	1	0.126	1.09	0.97	1.21
EDUCATION*	-0.32	0.15	4.75	1	0.029	0.73	0.55	0.97
GENDER	1.17	0.73	2.57	1	0.109	3.23	0.77	13.48
ACCULTURATION	-0.11	0.08	1.78	1	0.185	0.90	0.77	1.05
MBNT-S and Risk-Adjusted Variables – Model χ^2 (5, N = 85) = 60.22, p < .001								
MBNT-S*	-0.513	0.148	12.055	1	0.001	0.598	0.45	0.80
AGE*	0.136	0.055	6.021	1	0.014	1.146	1.03	1.28
EDUCATION*	-0.376	0.161	5.453	1	0.020	0.687	0.50	0.94
GENDER*	1.453	0.841	2.982	1	0.084	4.277	0.82	22.25
ACCULTURATION*	-0.153	0.082	3.429	1	0.064	0.858	0.73	1.01
15-SNT and Risk-Adjusted Variables - Model χ^2 (5, N = 85) = 49.32, p < .001								
15-SNT*	-0.260	0.087	8.993	1	0.003	0.771	0.65	0.91
AGE*	0.110	0.052	4.472	1	0.034	1.116	1.01	1.24
EDUCATION*	-0.331	0.135	6.048	1	0.014	0.718	0.55	0.94
GENDER*	1.667	0.756	4.859	1	0.028	5.297	1.20	23.32
ACCULTURATION*	-0.166	0.080	4.241	1	0.039	0.847	0.72	0.99

Note. Analysis of the contributions made by the naming tests and their covariates. Demented group size = 30. Nondemented group size = 55. * p < .10. TNT = Texas Naming Test. MBNT-S = Modified Boston Naming Test-Spanish. 15-SNT = 15-Item Spanish Naming Test.

Table 9

Classification Accuracy of Naming Tests Using Cut Scores with Highest AUC

Actual Diagnosis	Diagnostic Prediction		Sensitivity	Specificity	PPV	NPV
	ND	D				
TNT Cut Score = 23						
ND	35	20	-	63.6%	-	100%
D	0	30	100%	-	60%	-
Overall Percentage = 76.5%						
MBNT-S Cut Score = 12						
ND	52	3	-	94.5%	-	81%
D	12	18	60%	-	85%	-
Overall Percentage = 82%						
15-SNT Cut Score = 37						
ND	34	21	-	61.8%	-	89.5%
D	4	26	86.7%	-	55.3%	-
Overall Percentage = 70.6%						

Note. Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of naming tests using cut scores based upon highest area under the curve (AUC). TNT = Texas Naming Test. MBNT-S = Modified Boston Naming Test-Spanish. 15-SNT = 15-Item Spanish Naming Test.

Table 10

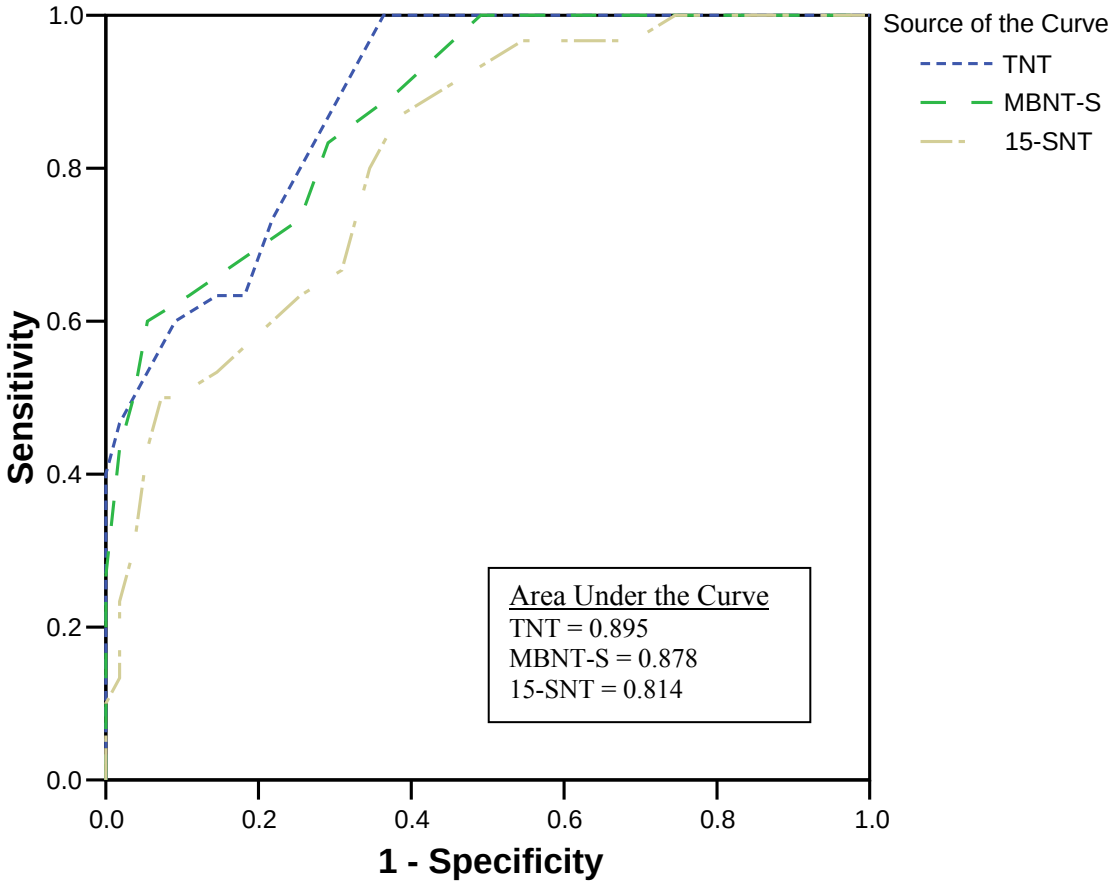
Naming Test Scores Stratified by Age and Education

	Age							
	≤ 74 years				≥ 75 years			
	Education				Education			
	≤ 5 years n = 16		≥ 6 years n = 14		≤ 5 years n = 13		≥ 6 years n = 12	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
TNT	22.56	4.63	27.93	2.87	23.15	4.14	25.33	4.38
MBNT-S	15.56	2.39	20.79	4.49	16.77	2.98	18.58	3.55
15-SNT	36.75	2.96	39.14	3.44	36.15	5.13	40.17	4.47

Note. Mean scores for the three Spanish naming tests stratified by age and education among nondemented Spanish-Speakers. Texas Naming Test (TNT), Modified Boston Naming Test-Spanish (MBNT-S), 15-item Spanish Naming Test (15-SNT). SD = Standard deviation.

Figure 1

ROC curves for Spanish Naming Tests



Note. ROC curve for each Spanish naming test shows sensitivity and specificity for each point on the respective curves.

APPENDIX A

The University of Texas Southwestern Medical Center at Dallas
Parkland Health & Hospital System

CONSENT TO PARTICIPATE IN RESEARCH

Title of Research: Development of the Texas Naming Test: A Test For Spanish-Speakers

Sponsor: C. Munro Cullum, Ph.D.

Investigators:	Telephone No. (regular office hours)	Telephone No. (other times)
C. Munro Cullum, Ph.D.	214-648-4646	
Laura Lacritz	214-648-4646	
Linda Hynan	214-648-2685	
Belinda Vicioso	214-648-2993	--
Monty Evans	214-648-4339	

PURPOSE: The purpose of this research is to develop a naming test for Spanish-speaking adults, and examine the influence of culture on such a test.

This research is being done because currently available naming tests are translated from English, and there is evidence to suggest language-related tests are more valid when developed in the language of interest.

PROCEDURES: If you wish to participate, you will be given a questionnaire in which you will be asked questions to determine your eligibility in the study, and the extent you have retained your Hispanic culture. Then you will be given a brief exam of cognitive ability. Finally, you will be shown line-drawings and asked to name the object depicted. The evaluation will last approximately less than one hour.

POSSIBLE RISK(S): This investigation has no more than minimal risk. There are no risks to pencil-paper, question-answer neurocognitive testing, although some minor, temporary frustration may arise during challenging tasks.

POSSIBLE BENEFITS
Greater understanding of you cultural background and the extent you have retained your Hispanic culture.

Benefit to others:
The development of a naming test made specifically for use with Spanish-speakers.

Greater understanding of cognitive ability of adult Spanish-speakers.

Data from this study will aid physicians distinguish Spanish-speaking individuals with and without dementia as naming impairment is a common deficit in dementia.

IRB File 012005-055
Consent form approved JAN 25 2005
Consent form expires JAN 24 2006

Greater understanding of the influence culture has on naming ability.

ALTERNATIVES TO PARTICIPATION IN THIS RESEARCH: Participation in this investigation is completely voluntary. You do not need to participate, and may decide to not participate at any time.

PAYMENT TO TAKE PART IN THIS RESEARCH: This investigation will not pay subjects for their participation.

VOLUNTARY PARTICIPATION IN RESEARCH: You have the right to agree or refuse to participate in this research. If you decide to participate and later change your mind, you are free to discontinue participation in the research at any time.

Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. Refusal to participate will not affect your legal rights or the quality of health care that you receive at this center.

RECORDS OF YOUR PARTICIPATION IN THIS RESEARCH: You have the right to privacy. Any information about you that is collected for this research will remain confidential as required by law. In addition to this consent form, you will be asked to sign an "Authorization for Use and Disclosure of Protected Health Information for Research Purposes."

YOUR QUESTIONS: Carlos Marquez de la Plata is available to answer your questions about this research at 214-648-4655. The Chairman of the IRB is available to answer questions about your rights as a participant in research. You may telephone the Chairman of the IRB during regular office hours at 214-648-3060.

IRB File 012005-055
Consent form approved JAN 25 2005
Consent form expires JAN 24 2006

YOU WILL HAVE A COPY OF THIS CONSENT FORM TO KEEP.

Your signature below certifies the following:

- You have read (or been read) the information provided above.
- You have received answers to all of your questions.
- You have freely decided to participate in this research.
- You understand that you are not giving up any of your legal rights.

Participant's Name (printed)

Participant's Signature — Date

Legally authorized representative's name (printed)
(if applicable)

Legally authorized representative's Signature — Date

Name (printed) of person obtaining Consent

Signature of person obtaining consent — Date

IRB File 012005-055
Consent form approved JAN 25 2005
Consent form expires JAN 24 2006

The University of Texas Southwestern Medical Center at Dallas
Parkland Health & Hospital System

Consentimiento para participar en investigación

Titulo de la Investigación: Development of the Texas Naming Test: A Test For Spanish-Speakers

Patrocinador: C. Munro Cullum, Ph.D.

Investigadores:	Teléfono (horas de trabajo)	Teléfono (a otras horas)
C. Munro Cullum, Ph.D.	214-648-4646	
Laura Lacritz	214-648-4646	
Linda Hynan	214-648-2685	
Belinda Vicioso	214-648-2993	--
Monty Evans	214-648-4339	

PROPOSITO: El propósito de esta investigación es para desarrollar un examen de lenguaje para Hispanos que hablan Español, y para examinar que influencia tiene la cultura de una persona en las habilidades lingüísticas.

Esta investigación se está haciendo porque no existen exámenes de este tipo hecho específicamente para personas que hablan Español. Los exámenes que existen son traducidos de Ingles y hay evidencia que sujere que exámenes de lenguaje son más validos si son escritos en el idioma de interés.

PROCEDIMIENTOS: Si le gustaría participar, usted va contestar algunas preguntas en un cuestionario. Las preguntas son acerca de usted para averiguar si usted tiene dificultades cognitivas y cuanto has retenido su cultura Hispana. Después usted va tomar un examen breve también para evaluar su manera de pensar. Últimamente, le enseñamos unos dibujos y pedimos que usted nos diga el nombre de la cosa en el dibujo. Esta evaluación dura aproximadamente menos una hora.

RIESGO(S) POSIBLE(S): Este estudio tiene riesgos mínimos. No hay riesgos asociados con exámenes de papel y lápiz, o preguntas cognitivas, aunque si puede haber un poco de frustración temporáneo por que algunas preguntas son mas difíciles.

BENEFICIOS POSIBLES
Mas entendimiento de sus cultura y cuanto has adaptado o resistido la cultura Americana. Esto puede beneficiarte por que su doctor puede tratarte mejor sabiendo que importante es su cultura.

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Beneficios para otras personas:
La creación de un examen hecho específicamente para usar con Hispanos que hablan Español.

Mas entendimiento de las habilidades y dificultades cognitivas de adultos Hispanos que hablan Español.

Información de este estudio le ayudaría a Doctores distinguir personas Hispanas con demencia y ellos sin demencia.

Mas entendimiento de la influencia que tenia la cultura de una persona en su habilidades lingüísticas.

ALTERNATIVAS A LA PARTICIPACION EN ESTA INVESTIGACION: Participación en este estudio es completamente voluntario. Usted no necesita participar y puede decir que no quiere participar.

PAGO POR PARTICIPACION EN ESTA INVESTIGACION: No hay pago para voluntarios de este estudio.

PARTICIPACION VOLUNTARIA EN INVESTIGACION: Usted tiene el derecho de aceptar o rechazar su participar en esta investigación. Si usted decide participar y después cambia de opinión, puede dejar de participar en la investigación en el momento en el que así lo decida.

Si usted se rehúsa a participar, no le causará ningún castigo o pérdida de los beneficios a los que usted tiene derecho. Rehusarse a participar no afectará sus derechos legales o la calidad de atención médica que usted reciba en este centro.

LOS REGISTROS DE SU PARTICIPACION EN ESTA INVESTIGACIÓN: Usted tiene el derecho a privacidad. Cualquier informacion que se colecte para esta investigación acerca de usted se mantendra confidencial como lo requiere la ley. Ademas de la forma de consentimiento, usted necesitara firmar la forma "Autorizacion para el uso y divulgacion de informacion medica de tipo confidencial en investigaciónes cientificas."

SUS PREGUNTAS: Carlos Marquez de la Plata está a su disposición para contestar sus preguntas sobre este estudio de investigación en el teléfono 214-648-4655. El Presidente del IRB esta a su disposición para contestar preguntas sobre sus derechos como participante en investigación. Usted puede llamar al Presidente del IRB durante horas de trabajo al teléfono 214-648-3060.

Archivo 012005-055
Documento aprobado en JAN 25 2005
Documento vence en JAN 24 2006

A USTED LE DARAN UNA COPIA DE ESTE ACUERDO PARA QUE LA GUARDE.

Su firma mas abajo, certifica lo siguiente:

- Usted a leído (o le han leído) la información proporcionada en los párrafos anteriores.
- Han contestado todas sus dudas y preguntas.
- Usted ha decidido participar en esta investigación por su propio deseo.
- Usted entiende que no ha renunciado a ninguno de sus derechos.

_____
Nombre del Participante (en letra de molde)

_____ _____
Firma del Participante Fecha

_____
Nombre del Representante legal responsable (en letra de molde) (si es aplicable)

_____ _____
Firma del Representante legal responsable Fecha

_____
Nombre (en letra de molde) de la persona que esta obteniendo el consentimiento

_____ _____
Firma de la Persona que esta obteniendo el consentimiento Fecha

APPENDIX B

Subject #_____

NEUROMEDICAL SCREENING AND DEMOGRAPHICS INTERVIEW

1. Edad _____

*** If under 55, exclude.**

2. Cuantos anos de escuela ha terminado? _____

   En que país? _____ En que estado? _____

3. Tienes usted dificultades de memoria?

   _____No
   _____Si. **(If yes, and does not have a diagnosis of dementia, exclude).**

4. En que país nació usted?

   _____U.S.
   _____Mexico
   _____Puerto Rico
   _____Cuba
   _____Otra

5. De que pais es su familia?

Mama	Papa	Abuelo 1	Abuela 1	Abuelo 2
Abuela 2				
____U.S.	____U.S.	____U.S.	____U.S.	____U.S.
____U.S.				
____Mexico	____Mexico	____Mexico	____Mexico	____Mexico
____Mexico				
____Puerto Rico	____Puerto Rico	____Puerto Rico	____Puerto Rico	____Puerto Rico
____Puerto Rico				
____Cuba	____Cuba	____Cuba	____Cuba	____Cuba
____Cuba				
____Otra	____Otra	____Otra	____Otra	____Otra
____Otra				

6.. Cuanto tiempo ha tenido viviendo en los Estados Unidos?

   _____Años _____meses

7. Tiene usted problemas de vista?

_____No
_____Si. Usas lentes? **(If yes, must wear them for the exam, if not, exclude).**

8. Alguna vez se ha desmayado, perdió la conciencia, perdió el conocimiento o ha estado usted hospitalizado después de haber sufrido un golpe en la cabeza por un pleito, caída, o accidente de coche?

_____Si (Explique) _____
_____No
_____No se

9. Si estuvo usted inconsciente, por cuanto tiempo? _____days _____minutes

*** If unconscious for more than 15 minutes, exclude.**

10. Al presente toma alcohol?

_____Si Que toma? _____
_____No

11. Si toma, con que frecuencia toma usted?

_____Una vez por **día**
_____Una vez por **semana**
_____Dos veces por **semana**
_____Mas que dos veces por **semana**
_____Una vez por **mes**
_____Varias veces por **año**

12. Cuanto toma usualmente cuando toma?

_____1-2 bebidas
_____3-4 bebidas
_____5 bebidas o mas

13. Por cuanto tiempo ha estado tomando esta cantidad?

_____Menos de 3 meses
_____3 a 6 meses
_____7 mesas a 1 año
_____Mas que 1 año
_____Mas que 5 años
_____10 años o mas

*** Exclude anyone who has been drinking 5 drinks or more per day for 6 months or longer.**

14. En tiempo pasado, ha tomado alcohol pero ya no toma?

_____Si
_____No

15. Si tomo, con que frecuencia?

_____Una vez por **día**
_____Una vez por **semana**
_____Dos veces por **semana**
_____Mas que dos veces por **semana**
_____Una vez por **mes**
_____Varias veces por **año**

16. Cuanto tomaba usualmente cuando tomaba?

_____1-2 bebidas
_____3-4 bebidas
_____5 bebidas o mas

17. Por cuanto tiempo tomo usted esta cantidad?

_____Menos de 3 meses
_____3 a 6 meses
_____7 mesas a 1 año
_____Mas que 1 año
_____Mas que 5 años
_____10 años o mas

*** Exclude anyone who drank 5 drinks or more per day for 6 months or longer.**

18. Actualmente usa usted algunas de estas drogas?

NO	SI	
_____	_____	Marihuana
_____	_____	LSD
_____	_____	Mezcalina
_____	_____	Peyote
_____	_____	STP
_____	_____	DMT
_____	_____	Psilocybin
_____	_____	Speed
_____	_____	Cocaine/Crack
_____	_____	Heroína
_____	_____	Opio
_____	_____	Inhalar pintura, goma, o gasolina

*** If using any drugs, exclude.**

19. Ha usado algunas de estas drogas en tiempo pasado pero ya no las usa?

_____Si (Explique)_____

_____No

20. Ha tenido pleitos cuando estaba tomando alcohol o usando drogas, o tuvo problemas médicos tomando o usando drogas?

_____Si

_____No

*** If yes, exclude.**

21. Alguna vez ha estado en tratamiento por problemas de alcohol o drogas?

_____Si

_____No

*** If treated for alcohol or drug problems, exclude.**

22. Ha tenido un ataque epiléptico o convulsión?

_____Si (Explique) _____

_____No

_____No se

*** Exclude if has Epiliepsy.**

23. Tiene usted o en alguna vez ha tenido:

	NO	SI	
a.	_____	_____	Operación de cerebro (1)
b.	_____	_____	Tumor de cerebro (1)
c.	_____	_____	Encefalitis (1)
d.	_____	_____	Meningitis (1)
e.	_____	_____	Múltiple Sclerosis (1)
f.	_____	_____	Enfermedad de Parkinsons (1)
g.	_____	_____	Sífilis (1)
h.	_____	_____	Embolia (1)
i.	_____	_____	Enfermedad Huntington's (1)
j.	_____	_____	Presión alta de sangre
k.	_____	_____	Diabetes
l.	_____	_____	Arteriosclerosis
m.	_____	_____	Enfermedad del corazón o pulmones
n.	_____	_____	Enfisema
o.	_____	_____	"Lupus" sistémico, eritematoso, o SIDA (1)
p.	_____	_____	Enfermedad Alzheimer's (1)

*** Exclude if not have diagnosis of dementia and have/has had illness marked with (1).**

24. Que clasificación se daría a usted mismo?

1. Muy Latino o Hispano
2. Mas Latino/Hispano que Americano
3. Casi igual Latino/Hispano y Americano
4. Mas Americano que Latino/Hispano
5. Muy Americano

Subject #: _____

NEUROMEDICAL SCREENING AND DEMOGRAPHICS INTERVIEW

1. Age _____

*** If under 55, exclude.**

2. How many years of school did you complete? _____

   In what country? _____ In what state? _____

3. Do you have memory difficulties?

   _____No
   _____Yes. **(If yes, and does not have a diagnosis of dementia, exclude).**

4. In what country were you born?

   _____U.S.
   _____Mexico
   _____Puerto Rico
   _____Cuba
   _____Otra

5. From what country does your family originate?

Mother	Father	Grandfather 1	Grandmother 1	Grandfather 2	Grandmother 2
____U.S.	____U.S.	____U.S.	____U.S.	____U.S.	____U.S.
____Mexico	____Mexico	____Mexico	____Mexico	____Mexico	____Mexico
____Puerto Rico	____Puerto Rico	____Puerto Rico	____Puerto Rico	____Puerto Rico	____Puerto Rico
____Cuba	____Cuba	____Cuba	____Cuba	____Cuba	____Cuba
____Otra	____Otra	____Otra	____Otra	____Otra	____Otra

6. How long have you lived in the United States?

   _____years _____months

7. Do you have problems seeing?

   _____No
   _____Yes. Do you wear corrective lenses? **(If yes, must wear them for the exam, if not, exclude).**

8. Have you ever fainted, passed out, lost consciousness, or been hospitalized after getting hit in the head in a fight, fall, or car accident?

_____Yes (Explain) _____
_____No
_____Don't know

9. If you were unconscious, for how long? _____days _____minutes

*** If unconscious for more than 15 minutes, exclude.**

10. Do you currently drink alcohol?

_____Yes What do you drink? _____
_____No

11. If yes, how often do you drink?

_____Once a **day**
_____Once a **week**
_____Twice a **week**
_____More than twice a **week**
_____Once a **month**
_____Several times a **year**

12. How much do you usually drink when you drink?

_____1-2 drinks
_____3-4 drinks
_____5 drinks or more

13. How long have you been drinking this amount?

_____Less than 3 months
_____3 to 6 months
_____7 months to 1 year
_____More than 1 year
_____More than 5 years
_____10 years or more

*** Exclude anyone who has been drinking 5 drinks or more per day for 6 months or longer.**

14. Have you used alcohol in the past but are no longer drinking?

_____Yes
_____No

15. If yes, how often did you drink?

_____Once a **day**
_____Once a **week**
_____Twice a **week**
_____More than twice a **week**
_____Once a **month**
_____Several times a **year**

16. How much did you usually drink when you used to drink?

_____1-2 drinks
_____3-4 drinks
_____5 drinks or more

17. How long did you drink this amount?

_____Less than 3 months
_____3 to 6 months
_____7 months to 1 year
_____More than 1 year
_____More than 5 years
_____10 years or more

*** Exclude anyone who drank 5 drinks or more per day for 6 months or longer.**

18. Do you currently use any of these drugs?

NO	YES	
_____	_____	Marijuana
_____	_____	LSD
_____	_____	Mescaline
_____	_____	Peyote
_____	_____	STP
_____	_____	DMT
_____	_____	Psilocybin
_____	_____	Speed
_____	_____	Cocaine/Crack
_____	_____	Heroine
_____	_____	Opium
_____	_____	Sniff paint, glue, or gasoline

*** If using any drugs, exclude.**

19. Have you used any of these drugs in the past but are no longer using them?

_____Yes (Explain)_____
_____No

20. Have you ever gotten into fights while drinking or using drugs, or had medical problems because of drinking or drugs?

_____Yes
_____No

*** If yes, exclude.**

21. Have you ever been treated for problems with alcohol or drugs?

_____Yes
_____No

*** If treated for alcohol or drug problems, exclude.**

22. Have you ever had a seizure or convulsion?

_____Yes (Explain) _____
_____No
_____Don't know

*** Exclude if has Epiliepsy.**

23. Do you have or have you ever had:

	NO	YES	
a.	_____	_____	Brain surgery (1)
b.	_____	_____	Brain tumor (1)
c.	_____	_____	Encephalitis (1)
d.	_____	_____	Meningitis (1)
e.	_____	_____	Multiple Sclerosis (1)
f.	_____	_____	Parkinson's Disease (1)
g.	_____	_____	Syphilis (1)
h.	_____	_____	Stroke (1)
i.	_____	_____	Huntington's Disease (1)
j.	_____	_____	High Blood Pressure
k.	_____	_____	Diabetes
l.	_____	_____	Arteriosclerosis
m.	_____	_____	Coronary Heart or Pulmonary disease
n.	_____	_____	Emphysema (COPD or CAO)
o.	_____	_____	Systemic "Lupus" Erythematosus, AIDS, HIV+ (1)
p.	_____	_____	Alzheimer's Disease (1)

*** Exclude if not have diagnosis of dementia and have/has had illness marked with (1).**

24. How would you rate yourself?

1. Very Latino or Hispanic
2. More Latino/Hispanic than American
3. Almost equally Latino/Hispanic and American
4. More American than Latino/Hispanic
5. Very American

APPENDIX C

SOUTHWESTERN
THE UNIVERSITY OF TEXAS
SOUTHWESTERN MEDICAL CENTER
AT DALLAS

Institutional Review Board

TO: Carlos Marquez de la Plata, MS
Psychiatry - 8846

FROM: David Karp, MD
Institutional Review Board 1 Chairperson
IRB - 8843

DATE: February 8, 2005

RE: **Expedited Approval of Protocol, Consent Form (Eng/Sp), Recruitment Flyer (Eng/Sp), and HIPAA Waiver**
Acknowledgment of HIPAA Authorization (Eng/Sp)
IRB Number: 012005-055
Title: Development of the Texas Naming Test: A Test for Spanish-Speakers

The Institutional Review Board (IRB) at the University of Texas Southwestern Medical Center has determined that this research is eligible for expedited review in accordance with 45 CFR 46.110(a)-(b)(1), 63 FR 60364, and 63 FR 60353. The IRB Chairman approved the protocol , informed consent document(Eng/Sp), Recruitment Flyer (Eng/Sp), and HIPAA Waiver on 01/25/2005. IRB approval of this research lasts until 01/24/2006. If the research continues beyond twelve months, you must apply for updated approval of the protocol one month before the date of expiration noted above. DHHS regulations permit oral presentation of informed consent information in conjunction with a short form written consent document (stating that the elements of consent have been presented orally) and a written summary of what is presented orally. A witness to the oral presentation is required, and the subject must be given copies of the short form document and the summary. **Your approved subject sample size is 80 subjects.**

Important Note: You must use a photocopy of the attached IRB-approved and stamped consent form(s). Use of a copy of any consent form on which the IRB-stamped approval and expiration dates are replaced by typescript or handwriting is prohibited.

When this procedure is used with subjects who do not speak or read English, (1) the oral presentation and the short form written document should be in a language understandable to the subject; (2) the IRB-approved English language informed consent document may serve as the summary; and (3) the witness should be fluent in both English and the language of the subject.

At the time of consent, (1) the short form document should be signed by the subject (or the subject's legally authorized representative); (2) the summary (i.e., the English language informed consent document) should be signed by the person obtaining consent as authorized under the protocol; and (3) the short form document and the summary should be signed by the witness. When the person obtaining consent is assisted by a translator, the translator may serve as the witness.

5323 Harry Hines Boulevard, CI.206 / Dallas, Texas 75390-8843 / (214)648-3060 Fax (214)648-2171

The IRB requires that you report to the Board any unexpected adverse events that occur during the study. In the future, if you require a modification to the protocol, obtain review and approval by the Board prior to implementing any changes except when prompt changes are necessary to eliminate apparent immediate hazards to a subject.

The IRB requires that all personnel who interact with research subjects or who have access to research data identified with the names of subjects receive a copy of the Federal Wide Assurance on file with the Department of Health and Human Services. Document their agreement to comply with the statements therein. Such documentation should be kept with other records of the research, which are subject to review by the IRB. Copies of the Federal Wide Assurance and the Federal regulations governing the participation of human subjects in research (45 CFR 46) are available on the IRB website:
(http://www8.utsouthwestern.edu/utsw/cda/dept31018/files/41623.html)
or from Jan Harrell at irb@utsouthwestern.edu.

If applicable, approval by the appropriate authority at a collaborating facility is required before subjects may be enrolled on this study.

If you have any questions related to this approval or the IRB, you may telephone Jan Harrell at 214.648.9453.

Enc: Consent Form(Eng/Sp)
HIPAA Authorization (Eng/Sp)
Recruitment Flyer (Eng/Sp)
HIPAA Waiver
Project Summary
NR1-Exp copy

DK/mgh

APPENDIX D

The University of Texas Southwestern Medical Center at Dallas
IRB Form MOD
Request for Protocol/Consent Modifications
(revised February 2005)

IRB File Number:	012005-055
Title of Research:	Development of the Texas Naming Test: A Test for Spanish-Speakers
Principal Investigator (name printed):	Carlos Marquez de la Plata, MS
Department:	Psychology
Mail Code at UT Southwestern:	8846
Phone Number:	214)648-4655
Research Coordinator (name printed):	Carlos Marquez de la Plata, MS
Mail Code at UT Southwestern:	8846
Phone Number:	214)648-4655

Directions: Per requirements of 45 CFR 46.103(b)(4) and 21 CFR 56.108(a)(3)(4), changes in approved research cannot be initiated without IRB review and approval unless necessary to eliminate apparent immediate hazards to the subject or provide important information germane to informed consent. In this circumstance, the IRB must be notified immediately. To review your Request for Protocol/Consent Modifications, the IRB must have the following information provided according to the specific instructions in each subpart. Additional pages can be used as necessary. The information should be typed.

Section I - Changes in Protocol

_____ yes
___X__ no

A) Description:

Describe <u>each</u> proposed change in the protocol separately in numbered sequence. If the proposed change will <u>directly</u> affect the subjects (e.g., additional tests, changes in drug dose or schedule, change in eligibility criteria, etc.), the justification/rationale for the change must be included. The investigator must advise the IRB in this section whether or not <u>each</u> proposed change that directly affects the subject requires revision of the consent document(s). Please submit (1) the previously approved protocol/project summary with **deletions red-lined**, (2) the proposed protocol/project summary with **additions highlighted**, and (3) a **fresh copy** of the new protocol/project summary. **The redlined and highlighted versions may be combined.** **<u>Note: Section IB must be completed and copies of the revised consent form(s) must be submitted.</u>**

B) Risk Analysis Update:

If the overall risk(s) associated with the research as originally stated in the IRB approved application are either increased or decreased, an updated assessment of the risk(s) must be provided. **If the risk profile of the research is unchanged, this should be stated.**

Section II - Changes in Consent Document(s)

_____ yes
___X__ no

A) Description:

Describe each proposed change in the consent document(s) that is not related to changes in the protocol described under Section IA (e.g., corrections of errors, sponsor-required changes in language, addition of new side effects) and provide the justification/rationale for the change unless it is self-evident. Note: Copies of the revised consent form(s) must be submitted as follows: (1) the previously approved consent form with **deletions red-lined**, (2) the proposed consent form with **additions highlighted**, and (3) a **fresh copy** of the new consent form. **The red-lined and highlighted versions may be combined. Make sure the IRB File # is listed in the footer.** Leave the approval and expiration dates blank.

B) Re-Consent:

Significant new findings (e.g., previously unknown side effects) developed during the course of the research or information concerning changes in protocol that may relate to the subject's willingness to continue participating must be provided to the subject per 45 CFR 46.116b(5) and 21 CFR 50.116b(5). Therefore, if any new information or changes could potentially affect a subject's willingness to continue participating in the study, they must be informed and consent renegotiated. **In this section, describe any plans to renegotiate consent.** If this is unnecessary, this must be stated and explained. Note: Copies of revised consent forms and/or amendments must be submitted with changes highlighted and a fresh copy provided as discussed above.

C) Change in Study Personnel:

List additions/deletions to study personnel. State the reason(s) for the change. Include copies of the revised consent documents. **Include the following when adding new study personnel (1) attach an NR-1 signature page with an original signature for new personnel. Also need the NR-1 signature page updated when changing the PI of the study. (2) training completion dates for *Human Subjects Protection, HIPAA (inclusive of Research Module), and Good Clinical Practices (if the study is industry sponsored) (3) use the format as listed below.***

□ Add □ Delete
NAME: _____ **HSP date:**_____; **HIPAA** _____; **GCP (if applicable)** _____
Reason for change:

Section III – Other Changes not related to protocol or consent

A) Description:

Describe each proposed change that is not related to changes in the protocol or consent:

Data collection at the Parkland Geriatric Clinic is proceeding better than planned for the nondemented elderly Spanish-speakers needed for my dissertation. The study requires 30 nondemented Spanish-speaking individuals, and I have tested 24 of these individuals to date. However, the geriatric clinic is not yielding the number of Spanish-speaking individuals with dementia that was expected, as I have only collected data from 2 of these individuals and need 30 by June 2005. For this reason, I propose two changes to the research project:

1. I would like to add the East Dallas Health Clinic as a site for data collection. They have agreed to allow me access to their patients and are also within the Parkland Health and Hospital System. Having this additional testing site may help us meet our goal because this site has a greater proportion of older Spanish-speakers than the current site, and likely a greater number of demented individuals obtaining services on any given day. Without an additional location it is doubtful I will obtain the number of demented participants necessary to analyze the collected data in a meaningful manner.

2. I would like to increase our requested number of participants to evaluate from 80 to 100 participants. The study will likely need to over-sample a greater number of patients than expected to obtain the necessary number of demented participants.

3/22/05 PRO; Summary updated MM

My signature certifies that I assure compliance with the ethical principles and institutional policies regarding the protection of human subjects in research as stated in Title 45 Code of Federal Regulations Part 46 (revised June 18, 1991; reprinted April 2, 1996) and the Multiple Project Assurance, and that I have reviewed this report for accuracy. In addition, my signature certifies that the proposed changes are necessary for scientific, medical, administrative or disclosure reasons in order to continue the research project as originally described in the initial IRB application.

Principal Investigator's Signature — Date: 3/14/05

Research Coordinator's Signature — Date: 3/14/05

For IRB office use only:

Approved Expedited Review ☑

Reviewer: MAR 17 2005 IRB Chair or Designee

Date:

Refer for Full Board review ❑ Reviewer: _____
IRB Chair or Designee

Date: _____

Periodic Review Approval ❑ Reviewer:_____

Date: _____

APPENDIX E

Parkland
Health & Hospital System

May 3, 2005

Carlos Marquez de la Plata, MD
Intern, Psychiatry
UTSWMC
MC 8846

Dear Dr. Marquez de la Plata,

Parkland Memorial Hospital

Community Oriented Primary Care

Parkland Community Health Plan, Inc.

Parkland Foundation

Your site request for the study "Development of the Texas Naming Test: A Test for Spanish-Speakers" has been approved. This approval is contingent upon compliance with UTSWMC IRB rules and regulations. The research expense identified for this study is the administrative review fee. Because this is an UTSW faculty-initiated study without sponsor and requesting minimal resources, this fee will be waived.

This research proposal was submitted to PHHS for recruitment of patients only. If your study period exceeds one year, send a copy of your annual IRB Continuing Review Form to Clinical Research. Also, please notify Clinical Research whenever the study is modified or closed.

All members of the research team that will be interacting with patients on the PHHS campus must have privileges to practice at Parkland and must wear current Parkland ID badges. This includes research nurses and assistants. For information on the process for obtaining privileges and/or a PHHS ID badge, contact the Office of Clinical Research & Performance Improvement. Please do not hesitate to contact me if I can be of further assistance with this study. I can be reached at (214) 590-8966 or via e-mail at vhart@parknet.pmh.org. Good luck with your study.

Sincerely,

Valerie Hart, RN, MSN
Associate Director, Clinical Research
Parkland Health & Hospital System, MC 7750

cc Annie Franklin
Judy Aten

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VITAE

Carlos Marquez de la Plata was born in Queens, New York, on May 21, 1977, the son of Carlos A. Marquez de la Plata and Luz Maria Marquez de la Plata. He graduated from North Garland High School in Garland, Texas. He received his Bachelor of Arts degree with a major in psychology from Stephen F. Austin State University in May 1999, and earned a Master of Science degree in Clinical Rehabilitation Psychology from Indiana University-Purdue University Indianapolis in May 2002. In August of 2001, he began doctoral studies in Clinical Psychology at the University of Texas Southwestern Medical Center at Dallas. He was awarded the degree of Doctor of Philosophy in Clinical Psychology in August of 2005, and began a clinical research postdoctoral fellowship shortly thereafter. In 2001, he married Teresa Saenz of Houston, Texas. Their first son, Robert Cooper Marquez de la Plata, was born in 2005.

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