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Neuropsychological Assessment of Hispanics

ANTONIO E. PUENTE AND ALFREDO ARDILA

In a volume on cultural aspects of clinical neuropsychology, a reader living in the United States, or for that matter the Americas, would certainly expect to find a chapter on Hispanics. Hispanics represent not only the fastest growing ethnic minority in the United States but represent a unique challenge to those who have a traditional view of ethnic minorities (i.e., ethnic minorities are essentially all African American). Hispanics represent an important challenge to those working in the field of clinical neuropsychology and it is the purpose of this chapter to explain not only those challenges but also their potential solutions.

The chapter begins by defining Hispanic emphasizing what is traditionally considered to be "Hispanic," such as language differences. In addition, less obvious issues are explored as well including educational, economic, religious, and psychological variables. This approach provides a foundation for addressing potential cultural differences between Hispanics and other groups, including other ethnic minorities, in neuropsychological abilities and performance. The second section focuses on neuropsychological research on Hispanics and clinical knowledge. A review of the literature, including the problems and limitations of existing knowledge, is considered. The third section comprises the major portion of the chapter. This section addresses such issues as heterogeneity of Hispanics, translation of tests, data and norms, cultural and cognitive equivalence, and the use of time. The fourth section focuses on potential solutions to these problems. This section includes the need for more research, personnel, understanding, public policy, and support from test publishers. The rationale for the preceding concerns is based not just on sociopolitical foundations but on the consideration of clinical experience and the scientific literature. The chapter ends with a summary and direction, both for short and long term possibilities.

The authors' intention is to synthesize existing concepts and research. It is important to note that the existing literature is not extensive. Further, some of the previously published work that will be considered is anecdotal, clinical, or theoretical. The critical question underlying the neuropsychological assessment of Hispanics is whether English and Spanish tests are actually measuring the same variables.

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Defining Hispanic

Merriam-Webster's Collegiate Dictionary defines the term Hispanic as relating to the people, speech, or culture of Spain and Portugal, or Latin America. The *Diccionario de la Lengua Española* (The Dictionary of the Spanish Language, [Real Academia Española, 1984]), edited by the Royal Spanish Academy, defines the word Hispanic as pertaining to (or relative to) Spain or the nations of Latin America. Seemingly, there is a basic agreement in terminology, even though according to *Merriam-Webster's Collegiate Dictionary*, Portugal and Brazil would be included as Hispanic nations. Hispanic is usually defined in the United States as a person whose primary (or, in some cases, secondary) language is Spanish. Further, there is an assumption that their heritage is of Spanish origin with their eventual roots being traceable back to Spain. Few, if any other, variables are factored into the definition of this ethnic group. These assumptions are misleading, maybe even incorrect. As a consequence, several important issues that help define Hispanic will be considered prior to addressing the primary focus of this chapter, the neuropsychology of the Spanish speaker.

According to the U.S. Bureau of the Census (1999) the total Hispanic population of the U.S. currently accounts for over 29 million people (11% of the total U.S. population). Of these Hispanics, 63% are of Mexican origin, 14.4% are of Central and South American origin, 10.6% are mainland Puerto Ricans (residents of Puerto Rico are not included in these statistics), 4.2% are of Cuban ancestry, and 7.4% are classified as being of "Other origin." The distribution of the Hispanic population in the United States, however, is quite uneven. Mexicans are concentrated in the southwestern states, especially California and Texas. Puerto Ricans mostly live in New York. In south Florida it is estimated that over half of the Hispanic population is Cuban. Taking into account not only the significant number of Spanish speakers, but also the fact that there is one Spanish-speaking associate state (Puerto Rico), the United States can be regarded, to a certain extent, as a partially Spanish-speaking country.

Heterogeneity

Hispanics are not a unified ethnic group. One could easily divide this group into individuals living or from the Iberian peninsula (i.e., Spain) and those living in or from the Americas. Those from Spain tend in many respects to be more similar to other Europeans than to Latin Americans. It is anticipated that the commonality will be further enhanced with the development of the European Union. In contrast, Hispanics in the United States have a form of the Spanish language, customs, and behaviors more akin with Latin American countries.

Hispanics living in or from the Americas could be further subdivided into two groups; North America (excepting Mexico) versus Mexico, Central and South America. Individuals living in or from the United States and Canada are more likely to have some knowledge of English and the American way of living. This could include an understanding of standardized testing, the importance of time and time-based productivity, and competition in academic situations. Thus, although data is lacking in this area, Hispanics from the United States are more likely than their Mexican, Central, and South American counterparts to appear similar to North American cohorts on standardized testing.

Individuals living in Latin America (i.e., Mexico, Central and South America) should also be further subdivided into subcultural groups. For the initial work on the translation of the Wechsler scales, a panel of experts from a variety of Latin-American countries subdivided Latin Americans into the following categories: Caribbean (e.g., Cuba), Mexican, Central American (e.g., Panama), and South American (e.g., Argentina). It was the belief of the

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Regionalisms or vernacular idiosyncrasies with respect to vocabulary exist in the use of Spanish. This is valid with any large language including English, Chinese, Russian, and so forth. Spanish is the primary language spoken in at least nineteen countries within the Western Hemisphere. Given the expansive geographic distribution and the huge number of speakers (some 400 million), regionalisms in vocabulary usage are common. Each country will also have its own slang terms that are commonly used in conversational speech. Minor phonological variations are also noted. In many Spanish-speaking areas S and Z as well as LL and Y correspond to a single phoneme. The affricate /ch/ sometimes becomes the fricative /sh/. Regional variations in the production of other phonemes are also found. Nonetheless, in general Spanish is a well unified language, and there is a standard Spanish (as there is also a standard English) that is easily understood by any Spanish speaker.

Confounding Variables

Hispanics are an ethnic group, like African Americans, Asian Americans, and Native Americans. Unlike those groups, however, Hispanics are not a race. In fact, Hispanics, although mainly Caucasians, also include people of color, including Native Americans, Asians, and blacks. Thus, Hispanics are multiracial and, depending on the area of interest, one race might be more represented than another (Shorris, 1992).

For a number of reasons, ranging from economic to sociopolitical, Hispanics have not achieved the level of educational attainment typically seen in the United States even when compared to other ethnic groups (Shorris, 1992). This decreased educational attainment holds true for both Hispanics living in and outside of the United States, regardless of their country of origin. There is growing evidence both in the neuropsychological literature (e.g., Lezak, 1995; Spreen & Strauss, 1998) in general, and with Hispanics in particular (e.g., Ardila, Rosselli, & Puente, 1994), that education plays an important role in the expression of brain function. Non–brain-damaged Hispanic illiterates appeared neuropsychologically highly similar to a portion of educated, brain-damaged persons (Ardila et al., 1994). Recent data in the United States (U.S. Bureau of the Census, 1999) suggest that Hispanics drop out of school almost three times as much as both their white counterparts (i.e., Anglo- or European Americans) as well as African Americans. In addition, Hispanics in the United States tend to start school later than average relative to other groups, and exit much earlier (Shorris, 1992). In the context of neuropsychological assessment of Hispanics education has to be carefully understood.

When testing people of low educational levels a significant error is frequently found, so in psychology as in neuropsychology: When normalizing psychological and neuropsychological instruments, people with 10 years of education and below are most frequently considered a homogenous educational group. Research has demonstrated that the educational effect on neuropsychological test performance is not a linear effect. Differences between zero and three years of education are usually highly significant; differences between three and six years of education can be lower; between six and nine are even lower, and so on. Virtually no differences are found between, for example, 12 and 15 years of education. This means the educational effect represents a kind of negatively accelerated curve, tending toward a plateau (Ardila, 1998a; Ostrosky, Ardila, Rosselli, Lopez-Arango, & Uriel-Mendoza, 1998). As a consequence, it is frankly erroneous to consider people with fewer than 10 years of education a homogenous group.

Religion and the understanding of the physical causes of diseases are similarly important variables. As a consequence, understanding and acceptance of neuropsychological assessment can be affected. However, the impact of religion on everyday life is extremely variable among Hispanics. For many Hispanics religion is simply a non-existing issue in life or it is just formally maintained as part of the culture. Many other Hispanics, on the other hand, view disease as something God has given them and could, with prayer and support, take back. Thus, appreciation of even the basic reasons for a neuropsychological assessment may be missing in this population of individuals.

Psychologists often misunderstand customs and traditions, especially as they pertain to psychological assessment. There are several important factors that are rarely appreciated (e.g., Perez-Arce & Puente, 1996; Puente & Salazar, 1998). These include time, relationship to examiner, and competitiveness. Time in Hispanic cultures is often something to be cherished, appreciated, and not necessarily conquered. Speed may not be so important: Good products are usually the result of a careful process, and quality and rush may be contradictory. Productivity and speed are often seen as less crucial by Hispanics, as enjoying life is more useful. Time is something, for example, that one spends together with friends and family. In contrast, other Americans have very intensive exposure and training in testing. For them, testing is a challenge and one is expected to perform his or her best and quickly. For Hispanics, it may be more important to be courteous with the examiner and establish a good rapport rather than perform well. It may be significant to have the opportunity to talk and interchange ideas. That is, the personal relationship with the examiner may be more important than the results of the evaluation. Competitiveness is also viewed with suspicion. Cooperation and social ability are by far more important. For example, in Hispanic cultures being "educated" implies having social skills, not necessarily educational attainment. In fact, it is not uncommon for an individual with a college degree to be thought of as uneducated because of arrogance and unpoliteness. Further, education in Latin American countries is not synonymous with the United States. For example, a college degree in Latin America equals a master's degree in the United States, both in the scope of education and the number of years of college required.

Acculturation

Another very critical, if not the most critical, factor in the neuropsychological assessment of Hispanics is acculturation. This concept is broadly defined as an individual's ability to understand and maneuver outside the culture that he or she was raised in and are most familiar with (Berry, 1997). The underlying question is, What is the criterion? In other words, What is being measured? It could be argued that the ultimate criterion in neuropsychological measurement is whether the patient has the ability to understand and answer the question correctly enough so that the examiner finds the answer to be generally "normal." This criterion is quite different from whether a brain injury actually exists. In other words, the issue ends up being whether the patient can perform the task, and nothing more. Hence, what could be measured in a neuropsychological evaluation may actually be acculturation of the patient. If the patient understands the value of time, and time is used to assess brain function (as is often the case), then the uninjured individual will respond in the allocated time. If the first premise is not true, the patient comes across as being brain-damaged (Ardila et al., 1994). Hispanics might not have understood that they had to respond as quickly as possible (something very "foreign" to them). To ignore this important concern will surely result in exaggeration of false positives.

Degree of acculturation is quite variable among Hispanics in the United States. Patterns of behavior, beliefs, and values among Hispanics living in the United States, however, tend to

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become progressively more similar to the middle-class American standards over time (Shorris, 1992). Thus, Hispanics living in the United States present mixed patterns of behaviors and eventually integrate their Latin values with the middle-class American values. Sometimes integration is not easy and conflict results.

Bilingualism

Bilingualism in general represents a rather complex phenomenon, but Spanish–English bilingualism in the United States is an extremely complex issue. Bilingualism in general depends upon the specific cultural context. The type of relationship between both culture groups represents one of the most the crucial points. For Hispanics in the United States, Spanish and English are not in conflict and the "rules of the game" are clear enough: English is the official language, Spanish is the informal one. But, combinations of Spanish, English and "Spanglish" (mixture of Spanish and English due to borrowings and code-switchings) are found. These combinations occur with regard to age of acquisition, proficiency (oral and written), preference (likely correlated with the degree of cultural identification), and patterns of use (English, Spanish, and any type of combination and mixture can be imagined) (Ardila, 1998b). The language spoken at home and at work can be English, Spanish, or any type of mixture of both.

Several distinctions have been proposed for grouping bilinguals. The distinction between early and late bilingualism seems to be the simplest one and the most extensively used (Manuel-Dupont, Ardila, Rosselli, & Puente, 1992). Early bilingual means the individual learned the second language before the age of about 12. Later acquisition of a second language will be mediated through the first language, and second language learning will be incomplete. The distinction among coordinate, compound, and subordinate bilingualism also has been extensively used. The coordinate bilingual is an early bilingual who can function as a native speaker of each language. These distinctions, though useful, are insufficient, as a particular bilingual can be classified in more than one group. There are many factors capable of affecting the ability to speak and understand a second language, but also there is the factor that bilingualism appears under quite different contexts and diverse circumstances.

Some variables are considered crucial to pinpoint the degree of bilingualism: age and sequence of acquisition, method of acquisition, schooling language, contexts of the two languages, patterns of use of the two languages, personal and social attitudes toward each language, and even individual differences in verbal abilities (Ardila, 1998b). However, these are only general variables and many variations can be found.

1. The age, sequence, and method of acquisition are not necessarily correlated with the degree of mastery of each language. As an example, many Hispanics in the United States initially learned Spanish in their native countries and used only Spanish until the age of five or six. Later, these people moved to the United States, and years later, they have serious difficulty speaking Spanish whereas they speak English fluently.
2. Schooling language can be indeed a highly significant and decisive variable. In fact, it may be the most crucial variable. Nonetheless, many children attend classes in English but communicate among each other in Spanish. And in general, the degree of exposure to either language can be extremely variable (e.g., home language, TV, neighbors, friends).
3. Personal and social attitudes toward the two languages can present significant variations. Some Hispanics in the United States consider that what is really important is to

learn proper English; Spanish matters considerably less, if at all. Others consider it important to maintain proficiency in Spanish. Thus, they expect their children not only to learn to speak Spanish, but also to read, to write, and even to appreciate Spanish language literature. A significant percentage of Hispanics falls between these two anchors. Their location in this spectrum is probably related to the degree of cultural identification, the type of links maintained with the native countries, their age, the community in which they live, and so forth. Again, significant heterogeneity exists in bilingual abilities.

4. Individual differences in the ability to learn a second language has not been a frequent topic in bilingualism literature (Kilborn, 1994). But evidently, very significant differences have been observed in the ability to learn and use not only a first, but also a second language.

Linguistic idiosyncrasies may influence the results in psychological and neuropsychological testing. For an example, spelling is not used in testing in Spanish—or in any language relying on a phonological writing, such as Italian or Russian. The overtrained ability to spell observed in English speakers has some general linguistic consequences. The use of spelled abbreviations is common in English, but not in Spanish. No native Spanish speaker would read UCLA as U, C, L, A, but /ukla/. Understanding abbreviated words such as MS or ADHD is extremely hard for Spanish speakers, and an intermediate decoding process ("multiple sclerosis," "attention deficit hyperactivity disorder") is usually required. This strong tendency to "spell" in English is observed even when saying numbers (345 is three, four, five). Spanish speakers prefer to cluster (345 is three hundred forty-five). English speakers do better in single digit span (about 7 digits) than Spanish speakers (about 5.2 digits), and it could be conjectured that Spanish speakers would do better in multiple-digit span (e.g., 34, 76, etc.). Interestingly, using bilingual subjects, digit span was found larger (closer to the English norm) when performing in English, and shorter (closer to the Spanish norm) when performing this test in Spanish (Ardila et al., in press).

Most Hispanics in the United States are bilinguals to different degrees, and quite often bilinguals may be at a significant disadvantage when tested in either language (Ardila et al., in press). A bilingual can be considered not just as the speaker of two different languages, but as the speaker of an extended language (Grosjean, 1989). Both languages can be active languages. As a matter of fact, their functional language can be either Spanish or English, or a mixture of both. Interference between the languages is expected to be high. *To use either Spanish or English testing materials and norms can penalize United States Spanish–English bilinguals.* Unfortunately, a clear solution to this difficult situation is not yet available.

Three procedures, however, could at least reduce the *bilingualism effect* in psychological and neuropsychological testing.

1. Have special norms for Spanish–English bilinguals. This solution does not seem easy, taking into consideration the tremendous heterogeneity of United States bilingualism.
2. The examiner could be a bilingual mastering a similar type of biligualism. Testing could be performed in Spanish, English, and any combination of both languages. Instructions and answers in either language or any mixture of both languages could be acceptable; both English and Spanish norms could be used, preferring the one favoring the subject.
3. Scores could be adjusted to neutralize the penalizing effect of bilingualism. The problem here is that we do not know how much the test scores should be adjusted in order to achieve reasonable validity. Of course, it depends on the test, the idio-

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None of these three solutions alone or combined seems easy to effect. Regardless, when testing United States Hispanic bilinguals, it should be emphasized that *current results are not necessarily reflecting the real individual's abilities, and his/her real performance may be higher than observed.* Obviously, in any neuropsychological report on a bilingual, the degree of bilingualism should be reported. An estimate could be arrived at by considering the age of acquisition of the second language, schooling language, use of both languages in everyday life, language used in testing, and norms used. Caution regarding bilingual issues needs to be inserted within the context of the report as well.

Neuropsychological Assessment of Hispanics

The focus of this section of the chapter will be on a review of the literature. Unfortunately, some of the existing literature is based on anecdotal or case studies, theoretical orientation, or both rather than comprehensive data gathering and analysis. Many studies are conducted and published outside the United States so their applicability to the United States is in question. For example, in Spain, several programs of research exist including those in Barcelona (Junque), Granada (Perez), Madrid (Cespedes, Iruarrizaga, Tobal, & Cano). In Latin America, research is often carried out by non-psychologists (including neurologists) and issues of culture and ethnicity are not as central to their concerns. Further, Hispanics are not an ethnic group in Mexico and Central and South America, as they represent the majority.

As the Catalan group in Barcelona remains relatively isolated from the rest of Spain, the other regions (e.g., Andalucia) of Spain remain relatively isolated from each other. In Latin America, the traditional neuropsychological group has been the Latin American Society of Neuropsychology (SLAN). They have attempted to publish a journal but for numerous reasons it does not appear to be widely distributed or indexed by the major abstracting services. Another group (Asociacion Latinoamericana de Neuropsicologia, ALAN) was formed in April 1999 with the inaugural meeting held in Cartagena, Colombia. An important reason for the development of an alternative organization for Latin America appears to be the issue of the journal. *Neuropsicologia, Neuropsiquiatria y Neurociencias* started publishing in 1999. However, neuropsychology is viewed more from a multidisciplinary perspective in Latin America than it is in the United States. For example, in Barcelona, Spain, neurologists have primarily developed the neuropsychological research and clinical programs. One of the first published Spanish neuropsychological tests, which came from Barcelona and resembled the Luria–Nebraska Neuropsychological Battery, was developed by a team led by a neurologist.

This multidisciplinary pattern is in sharp contrast to the United States where neuropsychology is closely aligned with psychology. For example, the Hispanic Neuropsychological Society is a loosely formed group that meets at either one of the two main neuropsychological meetings held each year: the National Academy of Neuropsychology (NAN) and the International Neuropsychological Society (INS). With bylaws, elected officers, and dues the group has served mostly as a network of professionals, mostly Hispanic, interested in the neuropsychological assessment of the Spanish-speaking patient. Numerous individuals including Alfredo Ardila, Rusen Echemendia, Josette Harris, Tedd Judd, Patricia Linn-Fuentes, Gloria Morote, Patricia Perez-Arce, Marcel Ponton, Antonio Puente, and Monica Rosselli helped organize this society.

Unfortunately, however, out of the estimated 4,000 neuropsychologists in the United States, it is our estimate (based on our experience and the membership of the Hispanic Neuropsychological Society) that fewer than 50 neuropsychologists could be considered either bilingual or bicultural. Further, almost all of these neuropsychologists (as evidenced by the membership of the Hispanic Neuropsychological Society) are practitioners rather than researchers. This paucity of academicians may help explain the paucity in the research literature.

Methodological Problems

It is not uncommon to assume that testing Hispanics involves simply the translation of a test into Spanish. The assumption is that the major problem in adapting the test is simply the language. Indeed, this approach is typically used to assess Hispanics. For example, the Minnesota Multiphasic Personality Inventory (MMPI), which is the most common test used by neuropsychologists (Camara, Nathan & Puente, in press), has been translated into Spanish. However, the Spanish is intended to be applicable to all Hispanic subgroups and there are no norms associated with the test. In this section, the numerous methodological problems facing a simple translation of tests will be discussed. The issues to be considered include translation, translators, sampling and norms, cultural meaningfulness, and cognitive equivalence.

Translation

The most common assumption involving the application of psychological tests to Spanish speakers is that all that is needed for the test to be used with a Spanish speaker is a translation of the text (Echmendia, Harris, Congett, Diaz, & Puente, 1997). Anecdotal evidence obtained from members of the Hispanic Neuropsychological Society reveals that most members have idiosyncratic translations that they have adapted for their own personal use or, in many cases, special tests are "translated" as the test is being administered, much like what would be done in an interview. Based on what our colleagues tell us at the annual meetings, standardized procedures are rarely used (in part because, for example, norms are not available). Numerous authors have described these procedures but in this case the suggestions by Brislin (1983) are used. While we consider the approach of Brislin to be traditional, there are several reasons for pursuing this approach. First, some of the early research started on the neuropsychology of Hispanics used this conceptual framework. Secondly, the use of back-translation insures a safeguard of potential mistakes in the initial translation. However, it is important to emphasize that back-translations should provide a general, rather than a specific check on the initial translation. Avoiding a back-translation places undue emphasizes on the original translation.

According to Brislin, there are several basic steps that should be used:

1. Initial translation
2. Back translation
3. Resolution of differences between the original English version and the resulting Spanish version

More recently, Muniz and Hambleton (1996) published a summary of the International Test Commission's guidelines for the translation and adaptation of tests. The ethical guidelines are as follows:

- General guidelin
- Competence
- Responsibility
- Safety of the tes
- Confidentiality

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- General guidelines for professional behavior
- Competence
- Responsibility
- Safety of the test materials
- Confidentiality

The general guidelines for appropriate use of tests include:

1. Understanding the testing situation
2. Selection of the appropriate tests
3. Consideration of potential biases
4. Adequate preparation for the testing situation
5. Adequate use of the tests
6. Appropriate scoring methods
7. Appropriate interpretation
8. Appropriate communication of findings
9. Revision of the test

Appropriate translation and adaptation requires much time and expertise. For example, in the translation of the Luria-Nebraska Neuropsychological Battery (Puente, Cespedes, Iruarrizaga, Cano, & Tobal, 2000) care had to be taken to use personnel versed in both languages; what Harris, Cullum, and Puente (1995) have called balanced-bilinguals. In addition, those individuals had to have expertise not just in Spanish but also in psychology. While it is not difficult to find balanced-bilinguals, it is difficult to find individuals who are truly bilingual and have the psychological knowledge necessary to understand the subtleties of testing. Also, the resolution of discrepancies of the original and initial translation require special understanding of issues that will later be addressed under the rubric of cognitive equivalence.

Another problem of a serious nature in working with Hispanics is that, as discussed previously, this ethnic group actually includes different subgroups (Shorris, 1992). As in the case with the Luria–Nebraska, the initial translation would have worked well with Cubans and Puerto Ricans because a Cuban completed it. The second translation, completed by Spaniards, would have been adequate for Castillian speakers. The final translation attempted to blend not only the those two translations but also use words and phrases that were generic to Spanish speakers. This required avoiding specific terminology that would be applicable to one culture. Standard Spanish was used, and this is indeed the best solution in developing and translating testing instruments. The problem of translating became even more evident in the initial efforts of translating the Wechsler intelligence scales into Spanish (Puente & Salazar, 1998).

A final issue is that a translation is not just a translation. Sometimes the intention is, for example, to have the similar number in Spanish represent a number in English. Translating digits is a very difficult task. *Eight* in English is one syllable whereas in Spanish *ocho* is two syllables. Furthermore, sometimes a literal translation simply does not make sense. The Luria–Nebraska has numerous proverbs and phrases, such as "the golden egg," which literally make no sense when translated. Hence, care must be taken to address the criterion in question.

Translators

If a test is published in English, then one could easily and incorrectly assume that all that is necessary is to use a translator. This simple approach is riddled with unforeseen difficulties.

Translators are not necessarily well versed in psychology or medical principles. As a consequence, very literal but nonsensical translations are produced. Thus, the patient views the question as literally not making any sense. Further, the translator might speak Spanish but be unfamiliar with Spanish culture. Next, there is the issue of time. If an item is to be timed, timing may get convoluted with figuring out the translation. Rapport is decreased when a third party acts as an intervening variable. Hence, the patient may view the evaluation and evaluator in a less trusting manner. Finally, subtleties will be missed if a translator is used. This could range from immediate nonverbal cues to more complex language responses, which are bound to be "translated out" when the final response is provided.

Norms and Sampling

Neuropsychological tests require a reference value. This reference value is typically in the form of a normative table. This is one reason why flexible batteries are often considered to be problematic. In other words, how does a unique set of tests compare between patients. Whereas neuropsychological tests have traditionally been weak in this regard, Golden, Purisch, and Hammeke (1979) provided norms for the Luria–Nebraska whereas both Reitan (Reitan & Wolfson, 1994) and more recently Heaton and colleagues (Heaton, Grant, & Matthews, 1991) have provided useful norms for the Halstead–Reitan Battery. Almost all tests published by the major publishing houses now include normative data.

Perusal of all of these normative sources, including two recent compendium books (Mitrushina, Boone, & D'Elia, 1999; Spreen & Strauss, 1998), suggests that while age and education (though not always) are taken into account, ethnic status almost always is not considered. As discussed earlier, this omission may reflect the overall belief that ethnic status or culture is not important in understanding brain function and dysfunction. However, as argued in this chapter, in the rest of this volume, and in other scholarly publication outlets, this omission introduces unnecessary error into the evaluation procedure.

If this premise is held to be true, then most neuropsychological tests provide faulty reference values. Samples that are used for normative tables rarely include ethnic status. This is indeed the case with the two historically used batteries in neuropsychology, the Halstead–Reitan and the Luria–Nebraska, as well as all the tests that are most frequently used by neuropsychologists (from a large-scaled survey completed by Camara, Nathan, & Puente, in press). One could argue that because ethnicity is not reported in the sampling procedure, the norms could be considered invalid.

Another related issue is that most neuropsychological tests do not have norms in Spanish. Few commercially available tests in Spanish contain Spanish-speaking norms. The Wechsler scales have been translated and have norms. However, the norms are from Puerto Rico only. Ardila, Rosselli, and Puente (1994) include in their book norms for over a dozen different tests. However, with most of the tests, the sample is limited to individuals living in Colombia. Further, most of the individuals representing the normative sample are over the age of 50. However, one particularly positive aspect of this set of norms is the inclusion of both literates and illiterates. Ponton and colleagues (Ponton, Satz, Herrera, & Ortiz, 1998) have recently published norms for a screening test. The norms, obtained from residents in Los Angeles, may prove to be more promising in that a variety of ethnic groups are included. However, as with other normative samples, no norms are found for the different Hispanic subgroups proposed in this chapter. This pattern is found also with other studies, such as Harris, Cullum, and Puente (1995) which reported preliminary results of a Spanish translation of the California Verbal

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Maybe it is unreasonable to expect norms for different Hispanic subgroups when (1) most neuropsychological tests are not adequately translated into Spanish, and (2) norms are not typically available. However, the goal of ethnic-group sampling and normative reference values should be considered as new studies are being formulated.

Cultural Meaningfulness

When administering and/or translating tests developed in a specific culture to a different cultural context, the issue of equivalence in cultural meaningfulness and relevance should be addressed. Items developed in a cultural context do not have the same relevance when translated to another culture. The Boston Naming Test is a good example. Several of the figures are simply unfamiliar and meaningless for Hispanics (e.g., the beaver is a North American animal), whereas others have a quite different degree of familiarity (e.g., igloo, frequently interpreted as an oven by Hispanics). Igloo is a very easy and familiar word for English speakers because it is used at the elementary school for learning the sound /i/). Several stories in the Picture Arrangement subtest of the WAIS are perceived by Hispanics as strange and rare. Cultural familiarity and meaningfulness can result in differences in performance.

Cognitive Equivalence

Assuming that all the preceding variables are held constant, then the real question becomes whether English and Spanish tests are measuring the same thing. In the section "Translation," the question of translation equivalence was addressed and the example of *eight* and *ocho*—one versus two syllables—was presented. When a test is translated the value of the test depends not on whether a translation is viable from a language perspective but, instead, from a cognitive one. Before a translation is completed or before a test is administered a clear understanding must be had of what is to be measured. This requires that the underlying factor for each item, scale, and test be understood. As Anderson (1996) has indicated, most tests measure a variety of things—ranging from immediate attention to verbal articulation to recognition and recall. Rarely does a test measure just one cognitive domain. The obvious step is to determine what is the most important or salient variable that needs to be measured and then proceed accordingly. In addition, one must then be careful that the item is of equal difficulty. For example, one of the most common tests for fluency in English is the F, A, S, whereas in Ardila, Rosselli, and Puente (1994) norms are provided for this test, because the frequency of occurrence for these letters is not the same in English as in Spanish. In the tests requiring digits in the WAIS and WISC, the question is whether the task is to remember a single-digit number or a single-digit number with a specified number of syllables. Interestingly, when a letter fluency test is administered to Hispanics, they mainly report nouns, and occasionally adjectives and verbs, but do not say grammatical words. English speakers report grammatical words in the letter fluency test (M. Rosselli & A. Ardila, unpublished manuscript). The reason for this difference is unclear, but it may suggest a subtle difference in the internal representation of words, i.e., what is understood as a word and how semantic nets are constructed. It may be conjectured that this difference relates to the clearer distinction between grammatical elements existing in Spanish relative to English. Outcome studies will determine the answer to these questions. For now, clinical experience and theoretical speculation provide the necessary framework from which to consider these important questions.

Interviewing

Unfortunately, a comprehensive review of the psychological literature revealed that no empirical articles were published on interviewing Hispanics in neuropsychological evaluations. The few articles that exist are based on clinical, anecdotal, or theoretical perspectives. For example, Puente and Perez (2000) have provided some background for structuring interviewing. Considering the complexities associated with cultural issues and the possibility of missing key elements in the interview, a structured approach will increase the likelihood of addressing the important issues in question. However, it is important to appreciate the importance of establishing rapport and explaining the purpose of the evaluation to Hispanics. This need is based on prior limited encounters with mental or medical professionals. Further, mental concerns may be private matters which are family and religious focused. Thus, opening up to a stranger is abnormal. And when opening up involves talking about personal issues (such as memory), the interview will hold special challenges and difficulties for the professional. Frequently, intellectual or cognitive testing may be perceived by the patient as aversive. In Latin America, highly educated people usually dislike, and try to avoid, testing. Intellectual testing may be even be perceived as humiliating and disrespectful of privacy. "Are you taking me for stupid?" is frequently the implicit message of some Hispanics when rejecting testing. People with little education, on the other hand, may be afraid and embarrassed when tested. In consequence, testing can be much more effective if performed in a flexible and informal way rather than using a rigid and highly standardized situation.

Testing

As previously mentioned, there are few research programs associated with neuropsychological assessment. A review of the neuropsychological testing literature reveals four cities; Denver, Los Angeles, Miami, and Wilmington, North Carolina. In Denver, Harris has focused on the development of a Spanish version of the California Verbal Learning Test. In Los Angeles, Ponton and Taussig, in separate and collaborative efforts, have published important information on Spanish speakers. In Miami, the work of Ardila and Rosselli as well as Loewenstein and colleagues (primarily with the elderly) has been ongoing for over a decade. In Wilmington, Puente and colleagues (primarily from universities in Madrid and Granada, Spain) have worked on a variety of issues including the translation and adaptation of the Wechsler scales (especially with Ardila and Harris, from Colorado). This section reviews the existing literature and ongoing research efforts on the neuropsychological testing of the Spanish speaker.

One of the first publications in the literature (Dergan, 1987) reflected the ongoing status of Hispanic neuropsychological assessment. In an article in *Avances en Psicologica Clinica Latinamericana*, Dergan describes an initial translation of the Luria–Nebraska Neuropsychological Battery. Although the translation violates many of the principles previously outlined in this chapter and no empirical data are reported, this article could be considered the first in the field. During the 1980s, a series of articles by Ardila and colleagues began to appear in the literature (e.g., Ardila & Rosselli, 1989; Ostrosky, Canseco, Quintana, Narvarro, & Ardila, 1985). Ardila's primary collaborators have been Monica Rosselli in Colombia and Miami, and Ostrosky in Mexico City. However, it was not until 1989 that L. Bernard first reported that "blacks" and Hispanics of average intellectual functioning but from poor academic backgrounds (and no reported brain impairment) exhibited scores that were in the impaired range.

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education and sociocultural status on brain functioning. As early as 1989, Ardila and colleagues (Ardila, Bryden, & Ostrosky, 1989) reported on the incidence of handedness in adolescent and adult Amazonian jungle residents. Also, Rosselli, Ardila, Florez, and Castro (1990) reported normative data on a Spanish translation of the Boston Diagnostic Aphasia Examination. This type of work resulted in the publication of *Neuropsychological Evaluation of the Spanish Speaker* by Ardila, Rosselli, and Puente (1994). The book was the first comprehensive publication to present a variety of neuropsychological tests across several cognitive domains that were translated into Spanish, ranging from tests of attention to visuopraxic abilities. The test results were stratified according to age and education. As previously discussed, both of these variables were associated with neuropsychological performance. It is interesting to note that some of the tests and test materials (e.g., Wechsler Memory Scale) could not be reproduced in the book due to copyright restrictions. The group has continued to publish extensively with their primary base of operation being Miami.

Another successful research program, also in Miami, has been that of Loewenstein. In a series of studies during the 1990s (Loewenstein, Arguelles, Arguelles, & Linn-Fuentes, 1994; Loewenstein, Duara, Arguelles, & Arguelles, 1995a; Loewenstein et al., 1995b) Loewenstein and colleagues have focused on developing neuropsychological instruments applicable to elderly Spanish speakers. They have reported the WAIS Block Design and Digit Symbol subtests along with the Mini-Mental State Examination were strong predictors of functional capacity. They have also been supporters of the use of culturally reduced or limited tests for assessing neuropsychological functioning. For example, Loewenstein et al. (1995a) reported that the Fuld Object Memory Evaluation was a useful tool for detecting dementia in Spanish speakers.

Taussig and Ponton have also published another series of studies. Using a customized translation of the WAIS-R, Taussig and colleagues (Taussig, Mack, & Henderson, 1996) reported good differentiation of controls to mildly-to-moderately demented Spanish speakers. Ponton, Satz, Herrera, Ortiz, et al. (1996) have provided normative data on 300 Hispanic subjects ranging from the age of 16 to 75 for the newly developed Neuropsychological Screening Battery for Hispanics. Gender, age, and education associations were seen for a variety of neuropsychological tests.

A series of unrelated articles have been published during the second half of the 1990s involving verbal fluency and learning. Harris, Cullum, and Puente (1995) investigated the effect of bilingualism on verbal learning and memory, using a scientifically constructed Spanish translation (most existing Spanish forms are not scientifically constructed) of the California Verbal Learning Test. A total of 44 Hispanics bilingual and 22 monolingual English speakers participated in this study. When groups were assessed in their dominant language, no significant differences were found.

Perri, Naplin, and Carpenter (1995) reported on the development of the Perri Test of Verbal Learning and Memory (in Spanish). The test consists of a 16-word list composed of 4 categories of 4 words each together with a 40-word recognition list. Normative data for 100 Spanish-speaking adults ranging from 15 to 70 years of age were presented. Hence, it appears that verbal learning and memory can be measured with appropriately translated and standardized instruments. However, it is important to note that verbal memory is more complicated than might initially appear and that normative data are inconclusive at this point. For example, Olazaran, Jacobs, and Stern (1996) reported that the differences in the number of syllables per digit string might have been responsible for an observed decrement in Spanish speakers on the WAIS-R digit span. More recently, Kempler, Teng, Dick, Taussig, and Davis (1998) have reported cross-ethnic differences (between Vietnamese and Spanish speakers) for fluency measures.

Other studies are apparently in progress. For example, Munges (1996) reported a work in progress at the University of California at Davis. The study focused on the development of a battery with strong psychometric characteristics in both English and Spanish across 12 different cognitive domains. The ongoing work of Stricks, Pittman, Jacobs, Sano, and Stern (1998) probably best reflects the current status of the field. In their attempt to obtain norms for English and Spanish-speaking elderly, a battery of neuropsychological tests was administered to almost 1,000 participants. Their findings indicate, as do many of the studies reviewed in this chapter, that age, education, and language are associated with neuropsychological test performance. What is important to note, however, is that there is increasing evidence to suggest that nonverbal tests are not culturally reduced. Indeed, it has long been held true that tests that are translated are high in cultural confound. However, increasing evidence has been recently reported that identifies similar problems, possibly even at a lower level, in tests that are nonverbal.

Interpretation

Most of the research reviewed, whether theoretical, clinical, or empirical, focused on the appropriate development of neuropsychological instruments. However, interpretation is the important element of the standardized neuropsychological assessment.

Taking information out of context invariably will result in increased error variance. Taking psychometric data without regard to the issues previously addressed is incorrect and unethical. For example, care must be taken to understand the limits of the test, the patient, and the evaluator in determining what the psychometric findings really mean. Hence, the clinician has to work doubly hard to appreciate the unusual nuances that are being faced with the Hispanic neuropsychological patient. However, the psychometric results must be framed in a complex biopsychosocial context (see Puente & McCaffrey, 1992). This would include not only an appreciation of the limits of the test but an understanding of the purpose of the examination (e.g., learning disability placement) and the context of the patient at the time of the evaluation (e.g., how many years in the United States). Arnold, Montgomery, Castaneda, and Longoria (1994) reported on the association of acculturation to performance on the Halstead–Reitan Neuropsychological Battery. The authors reported that acculturation levels correlated with the results of the following: Tactual Performance Test, the Seashore Rhythm Test, and the Halstead Category Test.

As argued previously (Puente & Perez, 2000), the issue in question may not necessarily be the neuropsychological status of the patient. The question may be whether the patient cognitively acculturated into the culture from which the principles are being derived for the foundation of the evaluation. As discussed earlier, many neuropsychological tests are timed. For Hispanics, time is not the same thing as for North Americans (Shorris, 1992). Hence, one would expect to see a greater percentage of false positives in situations when the psychometric results are not interpreted in a broad biopsychosocial context.

Suggestions and Potential Solutions

Neuropsychologists are beginning to address the problems that arise from the ever-expanding population of Hispanics in both the United States and Latin America. However, Hispanics as an ethnic group pose challenges that could serve as a foundation for conceptualizing the understanding of other ethnic minorities both in and outside the United States.

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Development of a Hispanic neuropsychology would serve but a small amount of what is needed to understand the neuropsychological function of minority individuals living in a majority culture (on any continent). In this section, several issues are presented that might assist not only in increasing the knowledge necessary to address the neuropsychological evaluation of the Spanish speaker but to lay the framework for larger issues involving cultural neuropsychology. It is anticipated that this foundation would, in turn, later serve as a starting point for expanding neuropsychological knowledge beyond the clinical to the more theoretical. Specifically, a more comprehensive understanding of culture and neuropsychology should serve as an initial step for questioning the possibility of the role of neuropsychological function in evolutionary focus. The work of Sperry (1994), Wilson (1995), and others provide glimpses into the kinds of questions that heretofore neuropsychology has not considered. For example, Does a commonality across cultures in neuropsychological functioning, or neuropsychological "g," exist? What role does culture play in shaping brain functioning across the life-span? Is neuropsychological function nothing more than the cognitive expression of cultural traits? And, if so, could neuropsychological analysis be nothing more than measuring cognitive acculturation? Could neuropsychological knowledge serve to understand more than an individual's cognitive and emotional status after brain injury? Could neuropsychological knowledge be the starting point for a more comprehensive understanding of the human condition? After all, with over a century of research, psychology has yet to produce much more than a strong methodology. "Why" questions have lagged way behind "how" questions. Conceivably, neuropsychology, especially from a cultural context, could serve to address these heretofore unanswered questions.

There is little question that neuropsychology is a very traditional psychological specialty. Most members of APA's Division 40, Clinical Neuropsychology, are white men, and in proportions not typical of other APA divisions (Puente & Marcotte, in press). Considering the mix of ethnic minorities in the population at large, it would seem that increasing the number of ethnic minorities in the field would be an obvious process for the field to encourage. Echemendia, Harris, Congett, and Puente (1997) reported that neuropsychologists do believe it is important to understand cultural issues, especially when dealing with Spanish speakers. Clearly, one way to resolve this is to increase the number of individuals who are bilingual and bilcultural. Unfortunately, there is limited evidence that this is occurring. The Hispanic Neuropsychological Society is comprised of about 50 members and the organization, at this point, is not very active. Also, a review of all the members of Division 40 revealed only one Hispanic is a fellow of the division and the total number of individuals with Hispanic surnames (one way to estimate Hispanic membership) approximately 1% of the close to 4,000 members. While the senior author of this chapter helped organize a Division 40 committee on ethnic minority affairs, its impact has been highly limited. The situation needs quick remedy. At present, there is little to suggest that the pipeline of Hispanic students is being reversed.

Another possible alternative, as the responders of the Echemendia et al. (1996) survey suggested, is to increase awareness of the issue in question. APA Ethical Guidelines emphasize the need for multicultural understanding and, presumably, this would obviously translate into neuropsychology as well. The authors of this chapter have presented two workshops at NAN, with the first one occurring during the early 1990s. Also, the Hispanic Neuropsychological Society has met irregularly at NAN, APA, and INS meetings. However, in almost all instances the number of non-Hispanics attending these meetings is always very, very small, in large part due to the lack of a regularly published newsletter or a very active group of officers.

Tests for Spanish speakers need to be developed and made widely available to neuropsychologists. Outside the work by Ardila (e.g., Ardila, Rosselli, & Puente, 1994), the few things

that are published are research reports with minimal normative data (except for Ponton et al, 1997). The major test publishing house in Spain (TEA) has made several tests (e.g., Stroop) available but almost none of the tests have norms. The first neuropsychological test development project the company sponsored, the Luria–Nebraska Neuropsychological Battery, will be published in the early part of 2000 (with an *N* of over 300). During the past decade, the Psychological Corporation has been interested in developing Spanish translations of the Wechsler scales (already described in this chapter). Under the direction of the senior author, a workgroup eventually was convened which included several of the prominent researchers both in neuropsychology and school psychology (including one of the authors of the Puerto Rican adaptation of the WISC). After a number of years of preliminary planning, a translation was eventually developed. After the painstaking work on developing the translation, a tryout phase was initiated. Due to the low number of responses and potential budgetary reasons, the project has been placed on hold for the foreseeable future. The commercially available tests that are currently available with norms (e.g., WAIS and WISC) are very outdated and included norms essentially only from Puerto Rico. Recently, the Psychological Corporation has begun to distribute in the United States a brief neuropsychological test battery known as NEUROPSI (Ostrosky-Solís, Ardila & Rosselli, 1997) developed in Spanish and normalized in Mexico.

What about the present? Considering the ever-increasing number of Spanish speakers in the United States, there is no question that serious problems are being faced by neuropsychologists wishing to evaluate Hispanics. Some practical suggestions include: 1) whenever possible, refer to a bilingual and bicultural neuropsychologist; 2) if possible, use appropriately translated tests; 3) if possible, use applicable norms; 4) if necessary, use a translator and preferably a trained and unbiased one; 5) understand the limitations of the evaluation procedure; and 6) identify perceived limitations in the context of the report and contextualize the overall findings within the limitations of the evaluation procedure.

At this point, the situation does not appear to have many potential remedies in the immediate future. Whereas there is clearly a demonstrated need and the field considers this a critical issue, there is little to suggest that the traditional approaches to testing Spanish speakers will be changed. Hence, translators, idiosyncratic translations, and no norms will continue for the foreseeable future unless the field begins to address more aggressively the issues in question.

Conclusion

Two issues should be evident from reading this chapter. One, there is an increasing need to understand the uniqueness associated with the neuropsychological evaluation of the Spanish speaker. Demographic characteristics indicate that the largest ethnic minority in the United States by the early part of the twenty-first century will be Hispanics. In some populous states, such as California, Texas, and Florida, Hispanics will be the majority very soon. The second issue is that there is no evidence to suggest that neuropsychology is prepared to meet that pressing need. In fact, using Division 40 membership and published tests with norms as rough guidelines, the field is nowhere near adequately addressing this problem. Whether the assumption is that culture is not important to brain function or whether it is that culture could be easily held constant with idiosyncratically translated tests with no norms is not clear. Regardless, the resolution of this problem would also further the generalizability of neuropsychology beyond the clinical realm. Such knowledge would go a long way in helping address the possibility of a neuropsychological "g" and in the development of a neuropsychology that is usable to more

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Introduction

Much of the attention give research literature is minim disappointing number of ne 1970s on subjects such as lateralization (Scott, Hynd, Gestalt (Taylor & Thweatt 1979). In the early 1980s st scales and hemispheric spe Mishra, Lord, & Sabers, 19 are more reflective of bioe status (Ferraro, Bercier, & (Anderson, Bastida, Krame Liu, & Schinke, 1995; Mye Manson, 1995).

Native Americans are although well over one-hal numbers are comparatively pling (Myers, Kagawa-Sin tion is available about the h the 60% of American Indi about how the other 40% o limitations of data gatherin

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