

CRITICAL REVIEW

An interdisciplinary approach to neuropsychological test construction: Perspectives from translation studies

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Abstract

Few neuropsychological tests have been developed specifically for non-English speakers. Rather, assessment measures are often derived from English source texts (STs) and translated into foreign language target texts (TTs). An abundant literature describes the potential for translation error occurring in test construction. While the neuropsychology community has striven to correct these inadequacies, interdisciplinary approaches to test translation have been largely ignored. Translation studies, which has roots in linguistics, semiotics, computer science, anthropology, and philosophy, may provide a much-needed framework for test development. We aim to apply specific aspects of Descriptive Translation Studies to present unique and heretofore unapplied frameworks to the socio-cultural conceptualizations of translated tests. In doing so, a more theoretical basis for test construction will be explored. To this end, translation theory can provide valuable insights toward the development of linguistically and culturally relevant neuropsychological test measures suitable for an increasingly diverse patient base. (*JINS*, 2010, *16*, 227–232.)

Keywords: Multiculturalism, Immigrants, Linguistics, Neuropsychology, Semantics, Pragmatics

INTRODUCTION

Approximately 31.1 million immigrants currently reside in the United States, representing well over 10% of the country's total population (U.S. Bureau of the Census, 2000, 2003). The 57% rise in immigration over the past decade is without parallel in modern history. This changing cross-cultural landscape presents unique challenges to the neurology and neuropsychology communities, as immigrant populations, overall, are at increased risk for congenital and acquired neurological disorders (DeGiorgio et al., 2005; Gill, Lenz, & Amolat, 2003; White et al., 2005; Zahuranec et al., 2006). With the elevated incidence of neurological disorders in non-U.S.-born residents comes an increased need for linguistically and culturally appropriate assessment tools designed to identify the known cognitive sequelae of neurological disorders in non-native English-speaking populations.

Yet, to date, comparatively few neuropsychological tests have been developed for, adapted to, or normalized in histor-

ically underrepresented populations. Rather, the majority of existing tests and questionnaires available in languages other than English are derived from existing English source texts (STs) and translated into foreign-language target texts (TTs). While there are many good examples of test translation and adaptation from STs into TTs, in many cases, the quality of translated verbal materials is of unacceptably poor quality (Artiola i Fortuny et al., 2005; Artiola i Fortuny & Mullaney, 1997). In such cases, errors in phonology, syntax, and the pragmatics of language result in test bias, which, in turn, threatens the validity of both the test itself and concluded findings. Published commentaries (e.g., Artiola i Fortuny et al., 2005; Artiola i Fortuny & Mullaney, 1997), position papers (i.e., NAN Education Paper: Professional Considerations for Improving the Neuropsychological Evaluation of Hispanics; Judd et al., 2009), and formal guidelines (e.g., the International Test Commission Test Adaptation Guidelines, 2000) have each striven to correct these inadequacies; however, past efforts have been largely restricted to the field of clinical neuropsychology and psychometrics. More interdisciplinary practices have rarely been pursued.

Translation studies, which has roots in linguistics, semiotics, computer science, anthropology, and philosophy, demonstrates

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the theoretical foundations needed to clarify inaccuracies observable in translated tests. To this end, we aim to apply specific aspects of target-oriented translation studies to present unique and heretofore unapplied frameworks to the socio-cultural conceptualizations of source and target neuropsychological tests. In particular, Toury's norm theory (1995) and Holmes's map theory (1978) will be extended to provide a more theoretical basis for test construction. More specifically, this theoretical investigation will examine the works of these and other translation studies theorists to illustrate the importance of preserving both linguistic and cultural relevance when translating STs. Specific examples of current neuropsychological test measures will be provided as examples in this context.

An Overview of Translation Studies

At its inception as a discipline, translation studies was largely governed by linguistics-based theories (cf., Catford, 1965; Nida, 1964), whereas equivalence between the source and target texts (e.g., finding TT items which can substitute for, or correspond to, ST items) was of the utmost importance. In the mid-1970s, translation studies began to emphasize the role of ideology, values, and social representation in translated texts, calling for a more target-oriented approach to translation. Two significant contributions to this new era of translation studies were made by Holmes (1978) and Toury (1995), whose theories acknowledge and update the value of "sense-for-sense" translation. This now preferred method of translation focuses on "[the] translation of general values or ideas shared by a certain community as to what is right and wrong—adequate or inadequate—into specific performance instructions appropriate for and applicable to certain situations" (Toury, 1980, pg. 57). Inasmuch, Toury's norm theory (1995) and Holmes's map theory (1978), to be discussed below, can be integrated to provide a strong foundation for the linguistically accurate, yet culturally relevant translation of neuropsychology STs into TTs.

Insights from Translation Studies: Toury's Norm Theory and Holmes's Map Theory

According to Toury, translatorship can be defined as the ability to appropriately play a socially defined role. Like in neuropsychology, "appropriateness" in translation can and should be defined by community-specific norms. All translation acts involve at least two languages and two cultural traditions, each of which will be governed by its own set of culture-bound standards of behavior (e.g., "norms"). As a result, a translator can choose to subscribe to the norms of either the source or the target culture, thus determining the overall socio-cultural relevance of the translation for the target audience. If the source culture is selected, cultural and linguistic incompatibilities may occur; in this case, the translation process will favor *adequacy* of the ST. However, if the translator follows the target text, he/she will deviate from the textual units found in the ST, thus fostering target-culture *acceptability*.

Holmes (1978) proposes a two-stage conception of the translation process, which sheds light on the operational

steps that the practicing translator follows (or should follow) in rendering a text into a target language. For Holmes (1978), understanding the ST entails disclosing its meaning on two interrelated "planes," the *serial* plane and the *structural* plane. Within the "serial plane," the translator is concerned with the analysis of words and sentences. In this model, a "structural plane" simultaneously exists for the translator, on which he/she contextualizes the lexical and grammatical items within the overall tone and ideology of the ST.

To understand the ST and decide upon a specific translation strategy, translators must first create a mental "map" of the ST. In other words, they produce a mental representation of the formal and socio-cultural properties of the ST. Such abstraction yields a three-fold conception of the ST, which is framed as follows: (1) a linguistic artifact¹; (2) a literary artifact; and (3) a socio-cultural artifact. Within this framework, literary artifact refers to a mental abstraction of the literary and poetic properties of the ST; however, this offers little applicability to neuropsychological test translation and will not be discussed in further detail. The map of the text as a linguistic artifact comprises the formal-linguistic properties found relevant in the configuration of the ST. At the level of socio-cultural artifact, the resulting map consists of an interpretation of how the overall socio-cultural norms applicable to the source culture are manifested in the ST. By extension, transferring the ST into the TT involves correspondence rules (in developing a TT map from ST map) and projection rules (in using map of the prospective TT to formulate it). This theoretical framework can be useful for test developers interested in translating neuropsychological tests into different languages (TT) in that it constitutes a theoretical guideline for improving existing practices, as well as supplying neuropsychologists with a framework to organize a critical assessment of the quality of existing translated test materials.

Accuracy versus Applicability of Neuropsychological Test Translation

For the purposes of translating neuropsychological test materials from English into different target languages, capturing *acceptability* appears to be more important than preserving *adequacy* in maintaining the reliability and validity of the test measures and the data yielded from them. To achieve an appropriate balance of *acceptability* and *adequacy*, test translators should be knowledgeable of both the purpose of the neuropsychological tests, as well as of the socio-cultural and linguistic norms of the target audience. Yet, it is often difficult to resolve such conflicts, as test developers and translators are often faced with texts that are correct in the ST, but lack comparable semantic or pragmatic relevance when translated into a target language. For example, several comments have been raised throughout the literature regarding linguistic equivalence of the Folstein Mini Mental Status

¹ The term "artifact," as used within Holmes's framework, refers to a specific mental conceptualization of the ST formulated by the practicing translator before producing the TT.

Examination (Folstein, Folstein, & McHugh, 1975) across a variety of TTs. Specifically, the phrase “No ifs, ands, or buts,” is often used in acute care and rehabilitation settings as a gross evaluation of symptoms related to buccofacial apraxia and aphasia. Yet, when translated into TT, this phrase must possess an equivalent number of words, a comparable mixture of vowels and consonants, and a similar idiomatic meaning to evaluate the underlying abilities in the same manner as the ST. While several alternative phrases have been suggested, such as “*No hay pero que valga*” (“There is nothing that is not of worth”; as cited in Valle, 1990), “*Si no bajo, entonces me subo*” (“If I do not go down then I will go up”; as cited in Valle, 1990), and “*Él quiere irse a casa*” (“He wants to go home”; Teng et al., 1994), these phrases lack comparable frequency and pragmatic ease of the original phrase in ST. To obviate similar concerns, a French translation of the CERAD (Consortium to Establish a Registry for Alzheimer’s disease) battery substituted “No ifs, ands, or buts” with the phrase “*Pas de si ni de mais*” (literally translated as “Neither yes, nor but” or, more loosely as “No ifs or buts”). This target sentence not only resembles the original one in terms of its overall meaning and the grammatical categories of its constituents, but it also serves to evaluate the same cognitive and articulatory functions as Geschwind’s original (e.g., articulatory agility, comprehension, and presence of paraphasias in repetition; Demers et al., 1994). It is also worth noting that the translation of a ST into a target language is further complicated by several culture-specific words that are transliterated (e.g., “bathroom” is referred to as “*bacauso*” [back house, e.g., outhouse] by Italian populations residing in the United States) or region-specific (e.g., the word “pants” is most commonly referred to as “*pantaloni*” in most of Italy, “*cazone*” in Naples, and “*cousi*” in Sicily).

We agree that careful back-translation of TTs is an important step in preserving the integrity of test measures, as alluded to by the following International Test Commission’s Test Adaptation Guidelines: a) “Test developers/publishers should insure that the adaptation process takes full account of linguistic and cultural differences among the populations for whom adapted versions of the instrument are intended [and b)] Test developers/publishers should provide evidence that the language use in the directions, rubrics, and items themselves as well as in the handbook are appropriate for all cultural and language populations for whom the instrument is intended.” While typographical and grammatical errors can be relatively easily identified by means of thoughtful back-translation, this technique has limited usefulness in ensuring the semantic, socio-cultural, and thematic relevance between ST and TT.

Norms and Maps in Actual Tests: Problems at the Linguistic Artifact Level

Like Artiola i Fortuny and colleagues (2005), we have noted several instances of spelling, morphological, and semantic mistakes in translated neuropsychological tests. The analysis of these can be organized with respect to the two levels of

mapping that prove relevant to neuropsychological test translation (i.e., by considering the abstraction of the ST, together with its subsequent projection onto the TT, as both linguistic and socio-cultural artifacts). Rather than using actual instances of error noted throughout extant translated tests, we will continue to use the illustrative example presented in the seminal work of Artiola i Fortuny et al. (2005).

These authors present an example of a measure of receptive language comprehension upon which Spanish-speaking examinees are read a sentence and asked to select the picture that best describes the scenario presented:

Original English item

The exhausted horseman wearing tattered clothes makes one last attempt to save his life and that of his pony by jumping over the swollen river to escape the armed bandits.

Spanish translation as may be found in test materials

El ginete casado que uso las ropas echas andrajadas hace una tentativa pasada de ahorrar su vida y de su potro saltando sobre el río hinchado para escapar a los bandidos armados.

Back translation into English

The married horseman that I use the clothes in rags makes a past tentative to economize his life and that of his colt jumping over the swollen river to escape from the armed bandits.

Multiple linguistic mistakes can be seen between the ST and its corresponding TT. At the level of spelling, these range from the use of wrong, yet homophonic, letters (e.g., “*ginete*” instead of “*jinete*,” both of which would be pronounced /xinetel/; and “*echas*” instead of “*hechas*,” both of which would be phonologically realized as /etʃas/) to the insertion of a letter which forms an entirely different word (cf. “*casado*” and “*cansado*”). Whereas the former may not be significant, the latter threatens the accuracy of the examinee’s comprehension.

Mistakes can also be found at the level of morphology. More specifically, the present participle form “wearing” in the opening reduced relative clause has been incorrectly translated as “*uso*,” which is the present form of the first person singular. An accurate translation would require a defining relative clause for the third person singular (i.e., “*que usa*”). The use of a wrong declension creates problems of reference within the clause which contribute to hindering the text’s comprehensibility.

Finally, several mistakes can be recognized concerning semantics. For example, the word “*ahorrar*” constitutes a mistranslation of the operative sense of the word “save” in the ST (the correct word usage in this case would be “*salvar*”). In addition, the expression “*río hinchado*” represents a literal and non-idiomatic translation (i.e., while “*hinchado*” is technically translated as “swollen,” it refers to something that is inflated or conceited, such as a “swollen” ankle or “swollen” ego), which, in the case of Artiola i Fortuny’s example, lacks comparable thematic content in Spanish.

The above mistakes illustrate the ways in which linguistic deficiencies in the TT can hinder intelligibility and comprehension, thus jeopardizing the validity and reliability of neuropsychological tests. Unfortunately, errors in test translation often extend beyond the linguistic basis, and also pervade the socio-cultural dimension of the TT.

Maps and Norms in Actual Tests: Problems at the Socio-cultural Artifact Level

While the employment of translators well-versed in the intricacies (including regional dialects) of the target culture will preserve linguistic relevance, the presence of socio-cultural bias threatens the acceptability of the target text. Measures evaluating language production are particularly susceptible to socio-cultural bias. For example, although confrontation naming tasks have long been recognized as one of the most sensitive tests for identifying and quantifying language impairment, they are also some of the most difficult to maintain equivalence between the elicited verbal responses in the source language versus the target language. It is important to note the potential effects of these dialectal lexical differences, as different terms may be culturally salient to specific world regions. For example, the terms “*cometa*,” “*papalote*,” “*chiringa*,” and “*barrilete*” are all technically correct responses when presenting a Spanish-speaker with a rendering of a kite (as presented on the Repeatable Battery for the Assessment of Neuropsychological Status-Spanish Research Edition; RBANS-SRE; Randolph, 1998b). While the Spanish-language confrontation naming subtests, such as the Pontón-Satz BNT (Pontón et al., 1992), provides multiple responses to each test item, it would be difficult, if not impossible, to provide every potentially correct response in all regional dialects of Spanish. In such cases, providing a phonemic cue to a patient after an obvious failure (e.g., when the response for “mushroom” is “umbrella”) becomes nothing more than a culturally based “guessing game” when judging which initial phoneme to provide. When devising their map of the ST (on the serial plane), test translators should consider as many synonymous options as possible as correct responses for each item.

Beyond dialectal differences on confrontation naming tasks, the cultural relevance of the pictures themselves may differ intraculturally. For example, when translating the Boston Naming Test (CERAD version) into French, test translators acknowledged the differing cultural salience of a picture of a canoe to French-speaking Canadians, as compared to the French population residing in France (Demers et al., 1994). To resolve this socio-cultural disparity, a “decentering” procedure was used, whereas the translated version was semantically different from the original, but the item was incontrovertibly focused on naming. The use of multiple translators from different world regions, or the production of region-specific test measures (e.g., individual versions appropriate for Puerto Ricans, Dominicans, and Cubans), may serve to reduce TT inadequacies at the level of the socio-cultural artifact. Such procedures were described by

Demers et al. (1994) in their translation of the CERAD battery into French, as psychometricians at each French-speaking center (including the province of Quebec and France) were invited to identify potential socio-cultural variations within their own unique patient populations and to provide regionally correct responses for each item on confrontation naming tests (including region-specific dialects and colloquialisms).

Although socio-cultural artifact is most often introduced by individual test items, test developers and translators must also be aware of the potential for fundamental differences between ST and TT occurring within the item instructions. In such cases, an entire subtest, rather than individual items, may possess questionable validity, leading to potentially incorrect data interpretation. To illustrate, dialectal lexical differences within the subtest instructions of the RBANS-SRE (Form A) Semantic Fluency subtest (Randolph, 1998b) have the potential to affect the administration and interpretation of neuropsychological testing and derivative test data. On this subtest, the instructions are as follows: “*Ahora quiero que me diga todos los nombres de los diferentes tipos de frutas y verduras que pueda recordar.*” Although the comparable instructions on the English version of the RBANS (Randolph, 1998a) ask the examinee to “...tell [me] all the names of all different kinds of fruits and vegetables that you can think of,” the Spanish-language text, provided above, is not semantically equivalent. Rather, by translating the word “vegetables” as “*verduras*,” a Spanish-speaking examinee is instructed to provide semantic exemplars from a specific subset of comestible plant life, rather than the more general, all-encompassing category of “vegetables.” Specifically, according to the Real Academia Española’s *Diccionario de la lengua Española – Vigésima segunda edición* (2003), the term “*verduras*” is defined as “Vegetables, especially leafy greens.” The variation in meaning between the two sets of instructions (English and Spanish) may result in the appearance of reduced semantic fluency in Spanish speakers, as examinees administered instructions containing the word “*verduras*” have the additional cognitive burden of selecting only leafy greens, rather than providing exemplars from a broader semantic category. Furthermore, the word “*verduras*” is yet another term with variable cultural salience to specific Spanish-speaking world regions. For example, when discussing the definition of this term with Spanish-speaking Puerto Ricans, “*verduras*” may have a different horticultural/agricultural denotation, indicating tubers or other root vegetables (e.g., potatoes and carrots; M. Rodríguez-Rivera, personal communication, April 2, 2009). Rather, the equivalent term for “vegetables” to the Puerto Rican native is more commonly and colloquially referred to as “*vegetales*.” Although distinctions like those between “*verduras*” and “*vegetales*” may superficially appear to be ‘quibbling semantics,’ they are a source of test bias, resulting in potentially lower scores for Spanish speakers overall, and highlight the intracultural differences within this population. While region-specific standardization samples and base rates would obviate some of these concerns (i.e., reduced verbal fluency produced

by Puertorriqueños given instructions including “*verduras*” would not confer as great a disadvantage if the normative sample and base rates of impairment reflected the additional difficulty of this subtest). Currently, the RBANS-SRE (Randolph, 1998b) does not possess a Spanish-specific normative sample (regardless of region or origin); rather, obtained data are standardized using norms derived from English speakers (provided the less complex “fruits and vegetables” instructions), placing Spanish speakers at an inherent disadvantage upon testing.

Problems at the Neuropsychological Artifact Level

Beyond the insights offered by translation studies, specifically, Toury’s Norm Theory and Holmes’s Map Theory, test developers and translators must also recognize the potential for artifact at the neuropsychological level. Although a neuropsychologist’s ability to accurately localize and lateralize neuroanatomical impairment is predicated on valid and reliable test instruments, language structure, language proficiency, and socio-cultural relevance are also important to consider before ascribing topographical brain correlations. Briefly, differential patterns of cerebral activation (and, consequently, impairment, when damaged) have been shown to be related to language structure (e.g., syllabographic *vs.* ideographic), proficiency, and age of acquisition (e.g., Paradis, 1995). Particular caution must be exercised when evaluating bilinguals, as language and task-specific areas have been identified in frontal, posterior temporal, and parietal areas (see Guissani, Roux, Lubrano, Gaini, & Bello, 2007, for review). Although beyond the scope of our commentary, socio-cultural artifact may obscure the inherent value of neuropsychological test data, as measures also require specific strategies and cognitive styles that may not be taught and cultivated across cultures (Ardila, 1995; Cohen, 1969). While an argument of a translated test’s *accuracy* and *applicability* of a test translation can certainly be strengthened by obtained data which clearly reflect known impairment within a brain region believed to underlie the neuropsychological function, a lack of correlation may also be attributed to factors beyond the translation process.

CONCLUSION

The assessment of non-native English-speaking immigrants presents the neuropsychology community at-large with a host of pragmatic and ethical dilemmas. Perhaps the greatest threat to high-quality service delivery exists at the level of test development—specifically, test translation and adaptation. Although potential sources of test bias have been well described by Artioli i Fortuny and colleagues (2005, 1997), the Hispanic Neuropsychological Society, and the International Test Commission, relatively few novel approaches have been proposed to improve the process of test development. Although careful proofreading to correct formal mistakes (e.g., spelling, conjugation, subject/verb and gender agreement) and back-translation are critical first steps, it is

clear that even tests developed using these strategies still place non-native English speakers at a clear disadvantage upon testing (Barr et al., 2009).

Even though the ideas discussed herein do not provide direct strategies for minimizing problems and discrepancies at both the linguistic and socio-cultural levels, Descriptive Translation Studies presents unique and heretofore unapplied frameworks to the socio-cultural conceptualizations of the TT. Specifically, we posit that translated and adapted neuropsychological test measures should emphasize the socio-cultural relevance of the TT, rather than focusing on formal linguistic equivalence between the ST and TT. From a translation studies perspective, because socio-cultural factors have such a profound impact on test comprehensibility, test translators should favor the target-culture norms, rather than strictly adhering to the norms of the source culture. In other words, the neuropsychological test translator should strive for *acceptability* rather than *adequacy*. Failure to do so may result in invalid and unreliable translated tests.

Despite the contributions of Toury’s and Holmes’s models for rationalizing the issues involved in neuropsychological test translation, it is important to acknowledge that these proposals are not without limitation. Most notably, test translators cannot be assumed to faithfully represent the worldview of all target-culture members. Thus, being subjectively biased, their work may also result in lack of linguistic and cultural relevance for specific patient populations. This is especially true of target cultures/languages evidencing great dialectal variation (cf. Mexican and Castilian Spanish), for which multiple TTs of the same ST should be considered to account for linguistic and socio-cultural differences. Limitations notwithstanding, the application of these target-oriented theoretical models proves particularly relevant to the translation of neuropsychological tests, as they cater for the production of TTs that are not just less ethnocentric, but also more valid and reliable.

Directions for Future Study

Functional approaches to translation may also offer valuable contributions to test translation. By framing neuropsychological test translation as a goal-oriented type of interlingual and intercultural conversion, test translators should be in a position to abandon invalid assumptions that place emphasis on the ST’s linguistic material and instead conceive of the translated test as a stand-alone text, rather than as a metatext of a previous one. To this end, the target culture’s norms should guide translation decisions at all times. It is also critical to remember that neuropsychological test translation and adaptation issues is a worldwide concern, not just within the United States. Future studies should strongly consider critical evaluations of neuropsychological test measures translated both to and from languages other than English. Additional investigation of English-language test measures requiring adaptation to ensure both *acceptability* and *adequacy* (e.g., English language measures capturing the dialects

and socio-cultural context of the United States, Australia, Canada, and Britain) is also highly warranted.

Regardless of the method or population of interest, test translation will undoubtedly benefit from interdisciplinary collaborations. Endorsing Holmes's view on translation (1998b/2000: 173, as cited in Munday, 2001, p. 10), we too believe that the field of neuropsychology can benefit from "forging other communication channels, cutting across traditional disciplines to reach all scholars working in the field from whatever background."

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