BRIEF COMMUNICATION

Clinical Comparison of Two Confrontation Naming Measures in Spanish-Speaking People with Epilepsy

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Abstract

Objective: Research on the lateralizing value of neuropsychological tests is limited among Latino people with epilepsy (PWE). This study aims to evaluate the utility of two confrontation naming measures in laterality determination.

Method: Data were collected from 71 Latino PWE who completed the Vocabulario Sobre Dibujos (VSD) and the Pontón-Satz Modified Boston Naming Test (MBNT). Raw and standardized scores were examined to determine diagnostic accuracy for predicting left hemisphere (LH) epilepsy for the full sample and using a sample-specific median split of educational attainment. Results: The MBNT demonstrated adequate classification accuracy (65.7%, 77.1%) as did the VSD (54.3%, 74.3%) for predicting LH seizure laterality using raw and standardized scores, respectively. For participants with ≥ 9 years of education (HEdu), receiver operator characteristic curve analyses showed a raw/percentile cutoff of ≤ 26/≤ 5th on the VSD, yielding 53%–58% sensitivity/87%–83% specificity. A raw score cutoff of ≤ 17 on MBNT produced 47% sensitivity/78% specificity for HEdu participants.

Conclusions: The VSD was found to have greater flexibility in determining cutoff scores using either raw or standardized scores for predicting seizure laterality. This study provides interpretation guidance, emphasizing education as a pertinent variable, to optimize lateralization accuracy for Latino PWE.

Keywords: Seizures, Functional laterality, Hispanic Americans, Neuropsychological tests, Language tests, Sensitivity and specificity

INTRODUCTION

The incidence of epilepsy in Hispanics is double than that of non-Hispanics in the United States (Berg et al., 2003). Interdisciplinary evaluation is a standard protocol for presurgical planning for epilepsy, with mesial temporal lobe epilepsy (TLE) being most common (Berg et al., 2010). Neuropsychological evaluation improves lateralization certainty. Neuropsychologists play a crucial role given the high stakes nature of potential cognitive morbidity (Baxendale et al., 2019). While ultimate lateralizing/localizing decisions are complex and informed by a multitude of patient-specific factors, confrontation naming tests have been found to be sensitive to language dominant temporal lobe dysfunction (Lee, 2010). The Boston Naming Test (BNT) is often the confrontation naming test of choice (Vogt et al., 2017). Busch, Frazier, Iampietro, Chapin, and Kubu (2009) found that the BNT, in combination with other moderating variables (i.e., Full Scale IQ [FSIQ], age of onset, and duration of epilepsy), was useful in predicting surgical lateralization and the epileptogenic zone, within English-speaking populations.

Neuropsychological tests for Spanish-speakers in the United States remain somewhat limited. An early modification of the BNT was created, the Pontón-Satz Modified Boston Naming Test (MBNT; Pontón et al., 1992). The MBNT was included in the Neuropsychological Screening Battery for Hispanics (NeSBHIS), developed to address the dearth of neuropsychological measures for Spanish-speakers with neurological conditions (Pontón et al., 1992). The NeSBHIS was created in Los Angeles, CA, and primarily
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This study aims to provide neuropsychologists with additional data on the lateralizing value of two confrontation naming tests, the MBNT and the VSD, with Spanish-speaking PWE. Given the dearth of extant research focusing on both dominant and nondominant TLE lateralizing value, this study is poised to assess the predictive value in accurately classifying cognitive impairment in a subgroup of Latinos with TLE; however, seizure lateralization was limited when using the MBNT (Barr et al., 2009). Lancman, Vazquez-Casals, Perrine, Feoli, and Myers (2012) evaluated the lateralizing merits of the core NeSBHIS battery and select subtests of the Batería III Woodcock-Muñoz (Muñoz-Sandoval, Woodcock, McGrew, & Mather, 2005) in a sample of 39 Latino PWE. Findings were such that confrontation naming emerged from their battery as clinically useful in lateralization, with 80% sensitivity and 67% specificity for predicting left hemisphere (LH) seizure onset (Lancman et al., 2012). The mixed results from these investigations render it difficult to apply findings to current clinical practice. Adding to the interpretive complexity of these studies is that other confrontation naming tests, such as the Vocabulario Sobre Dibujos (VSD) of the Batería III Woodcock-Muñoz, have not been directly compared to the MBNT in the same study. Doing so would allow for better control of regional and educational differences, as the respective cohort represents different nations of origin from those of the original NeSBHIS sample (Smith et al., 2020). Along these same lines, educational opportunities for Latinos exist, such as access to education, quality of education, and level of compulsory education (Smith et al., 2020).

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MATERIALS AND METHODS

This study was completed in accordance with the Declaration of Helsinki and IRB approval from the Rancho Research Institute.

Participants

Participants in this study were primarily immigrant, Hispanic patients from a county-funded, comprehensive epilepsy treatment center in Los Angeles, CA. One hundred sixty-nine Latino PWE referred for outpatient neuropsychological assessment services as part of their comprehensive epilepsy workup completed a battery of Spanish measures. Of these, 114 were lateralized to the right hemisphere (RH) or LH, operationally defined by consensus at interdisciplinary epilepsy conference, which encompasses clinical information gathered from inpatient surface video-EEG, neuropsychological data, and brain imaging (i.e., MRI, PET, SPECT). Of these, 71 had data for the MBNT and VSD. Seizure laterality for this subsample was 36 RH and 35 LH. Demographic and clinical characteristics are provided in Table 1. No significant differences were found between RH and LH participants across demographic and clinical characteristics.

Measures

**Pontón-Satz Modified Boston Naming Test (MBNT)**

This subtest requires examinees to denominate 30 line drawn objects, presented in the order of increasing difficulty. If the examinee is unable to provide a correct answer spontaneously within 20 seconds or misperceives the stimuli, a semantic cue is provided. If the examinee is unable to provide the correct response with a semantic cue, the examiner provides a phonemic cue. One point is given for each correct spontaneous response or a correct response provided after a semantic cue for a total of 30 possible points. Comparatively to the items in the BNT, the MBNT removes culturally inappropriate items (e.g., igloo), leaving a total of 30 items as opposed to 60 items. Normative data stratified by age and gender exist (Ponton et al., 1996), though to circumvent the small cell sizes in the data set and to extend the work of Smith et al. (2020), education-stratified norms were utilized (Ponton & Leon, 2001).

**Vocabulario Sobre Dibujos (VSD)**

This subtest was designed to assess oral language and lexical knowledge (i.e., expressive language) through identification (i.e., naming) of detailed, color illustrated objects. Item difficulty increases through gradual presentation of less common objects. All examinees start at item 1 and progress through item 46 or until meeting the discontinuation rule of six consecutive incorrect responses. Raw score transformations can be adjusted for either age or education. For the current study, education-corrected norms were utilized (Muñoz-Sandoval et al., 2005).

Data Analyses

Descriptive statistics were used to preliminarily determine the relative performance differences on the two measures of interest across lateralization groups. Independent $t$ tests compared group differences on medical and demographic variables. Binary logistic regressions were computed for raw and standardized scores for the two confrontation naming measures. Receiver operating characteristic (ROC) curve analyses were computed to assess the diagnostic accuracy and sensitivity/ specificity for predicting LH epilepsy for the full sample as composed of an immigrant population with Mexico and Central American countries as the prominent nations of origins (Pontón & León-Carrión, 2001; Smith et al., 2020).

In the context of epilepsy, the clinical utility of the NeSBHIS has been explored. The NeSBHIS construct validity was documented in Latino people with epilepsy (PWE; Bender et al., 2009). Few studies, however, have investigated the lateralizing value of the NeSBHIS, including the MBNT, among Spanish-speakers in the United States. One study established the diagnostic validity of the NeSBHIS for identifying cognitive impairment in a subgroup of Latinos with TLE; however, seizure lateralization was limited when using the MBNT (Barr et al., 2009). Lancman, Vazquez-Casals, Perrine, Feoli, and Myers (2012) evaluated the lateralizing merits of the core NeSBHIS battery and select subtests of the Batería III Woodcock-Muñoz (Muñoz-Sandoval, Woodcock, McGrew, & Mather, 2005) in a sample of 39 Latino PWE. Findings were such that confrontation naming emerged from their battery as clinically useful in lateralization, with 80% sensitivity and 67% specificity for predicting left hemisphere (LH) seizure onset (Lancman et al., 2012). The mixed results from these investigations render it difficult to apply findings to current clinical practice. Adding to the interpretive complexity of these studies is that other confrontation naming tests, such as the Vocabulario Sobre Dibujos (VSD) of the Batería III Woodcock-Muñoz, have not been directly compared to the MBNT in the same study. Doing so would allow for better control of regional and educational differences, as the respective cohort represents different nations of origin from those of the original NeSBHIS sample (Smith et al., 2020). Along these same lines, educational opportunities for Latinos exist, such as access to education, quality of education, and level of compulsory education (Smith et al., 2020).

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well as using a sample-specific median split of educational attainment. A median split was used to explore lateralizing utility in the participants with low education (LEdu; <9 years) and high education (HEdu; ≥9 years), consistent with the previously posited position that Spanish-speaking participants with LEdu did not have NeSBHIS scores that lateralized compared to those with HEdu (Shaw, Campelo Smith, Chavarria, Kolberg, & Smith, 2012; Smith et al., 2020).

### RESULTS

Independent *t* tests indicated that, using raw scores, LH onset groups performed worse than RH onset groups on both naming tests (see Table 1). Classification accuracy of left temporal lobe seizure laterality using raw scores on the MBNT was 65.7% (*p* = .05) and 54.3% (*p* = .03) using the VSD. Raw scores on both measures were statistically significant, but this finding was not concordant when education-corrected scores were examined. Because percentiles produced better classification accuracy (77.1% for the MBNT and 74.3% for the VSD), all four models were further examined with the hypothesis that years of education was interacting with the model. Pearson correlations showed that the level of education is significantly correlated with raw scores of both MBNT (*r* = .327, *p* = .005) and the VSD (*r* = .409, *p* < .001). Given this finding, ROC analyses were run with and without a median split of 9 years of education.

For the full sample, VSD was significant with both raw (AUC = .662; *p* = .019) and education-corrected standardized scores (AUC = .639; *p* = .044), while the MBNT was not significant for raw (AUC = .624; *p* = .073) or education-corrected

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### Table 1. Demographic and descriptive data between right and left hemisphere groups

| Variable                        | Right hemisphere (n = 36) | Left hemisphere (n = 35) | Group comparison |
|---------------------------------|--------------------------|--------------------------|-----------------|
| Age (SD)                        | 36.8 (9.4)               | 36.6 (10.3)              | *t*(69) = .06, *p* = .95 |
| Education (SD)                  | 8.4 (4.1)                | 8.4 (3.0)                | *t*(69) = −.08, *p* = .94 |
| Sex                             |                          |                          |                 |
| Male                            | 18                       | 15                       |                 |
| Female                          | 18                       | 20                       |                 |
| Nationality                     |                          |                          |                 |
| Mexico                          | 26                       | 22                       |                 |
| El Salvador                     | 6                        | 7                        |                 |
| Guatemala                       | 3                        | 2                        |                 |
| Peru                            | 1                        | –                        |                 |
| USA                             | –                        | 3                        |                 |
| Nicaragua                       | –                        | 1                        |                 |
| Language                        |                          |                          |                 |
| Spanish-only                    | 28                       | 28                       |                 |
| Bilingual                       | 8                        | 7                        |                 |
| Raven’s Progressive Matrices Performance |                 |                          |                 |
| Impaired                        | 5                        | 4                        |                 |
| Borderline                      | 5                        | 4                        |                 |
| Low Average                     | 13                       | 10                       | *X²*(4, *N* = 71) = 2.76, *p* = .59 |
| Average                         | 9                        | 15                       |                 |
| High Average                    | 4                        | 2                        |                 |
| Seizure Location (n = 45)       |                          |                          | *X²*(5, *N* = 44) = 5.80, *p* = .33 |
| Mesial Temporal                 | 19                       | 16                       |                 |
| Frontal                         | 3                        | 1                        |                 |
| Parietal                        | –                        | 1                        |                 |
| Occipital                       | –                        | 1                        |                 |
| Multi-lobe                      | –                        | 1                        |                 |
| Lateral Temporal                | –                        | 1                        |                 |
| Age of Onset (SD)               | 12.7 (10.6)              | 12.8 (12.1)              | *t*(69) = .05, *p* = .96 |
| Years with Seizures (SD)        | 23.9 (10.3)              | 23.8 (10.9)              | *t*(69) = .04, *p* = .97 |
| Number of AEDs                  | 2.7 (8.6)                | 2.7 (8)                  | *t*(69) = .19, *p* = .85 |
| Number of Failed AEDs           | 1.9 (1.4)                | 1.5 (1.2)                | *t*(53) = 1.25, *p* = .22 |
| MBNT Raw (SD)                   | 18.3 (4.3)               | 16.4 (3.3)               | *t*(69) = 2.04, *p* = .04* |
| MBNT %ile (SD)                  | 17.7 (22.4)              | 11.6 (18.4)              | *t*(69) = 1.26, *p* = .21 |
| VSD Raw (SD)                    | 27.3 (4.6)               | 25.1 (3.4)               | *t*(69) = 2.26, *p* = .03* |
| VSD %ile (SD)                   | 18.8 (17.9)              | 13.3 (16.9)              | *t*(69) = 1.34, *p* = .18 |

MBNT = Pontón-Satz Modified Boston Naming Test; VSD = Vocabulario Sobre Dibujos. *p* < .05.
standardized scores (AUC = .594; p = .171). The VSD had marginally better overall model quality (.54, .51) compared to the MBNT (.49, .46) for raw and percentile scores, respectively.

For HEdu participants, raw scores on the VSD improved model fit (AUC = .788, p < .001) as did percentiles (AUC = .747, p = .001), but findings were nonsignificant for LEdu participants (p = .464, p = .812) for either scores. Similar patterns were observed on the MBNT raw/percentile scores for the HEdu cohort (AUC = .746, p = .002, AUC = .682, p = .03) improving diagnostic accuracy, with nonsignificant findings in the LEdu cohort (AUC = .353, p = .175, AUC = 0.382, p = .27). Again, the VSD produced higher models (.63) compared to MBNT (.55) for the HEdu cohort. The diagnostic accuracy for the HEdu group is summarized in Table 2.

### DISCUSSION

This study investigated two confrontation naming tests’ predictive accuracy in classifying seizure laterality in a primarily immigrant cohort of Spanish-speaking PWE living in the United States. Historically, the BNT served as the primary confrontation naming measure in English-speaking patients. While neuropsychologists understand the importance of controlling for pertinent factors such as age and education, other disciplines (i.e., neurology) may be apt to use raw score cutoffs. As the sociodemographic makeup of people living in the United States expands, the onus of responsibility for cross-validating traditional cognitive measures to populations underrepresented in extant normative data often falls to clinical researchers to reduce risk of incorrect classification of cognitive impairment (Olabarrieta-Landa et al., 2019).

Utilization of raw scores, regardless of confrontation naming measure, yielded statistically significant differences between epilepsy laterality. Previous research has been discordant with respect to the ability of the MBNT to predict side of seizure onset. The current study demonstrates that when pertinent factors are considered, such as similitude between the patient sample and the reference sample, raw scores and education adjusted scores are both able to capture dominant hemisphere deficiencies.

Patient-specific factors, such as years of education, are correlated with rates of low scores (Brooks, Iverson, & White, 2009). Therefore, it seemed most appropriate to utilize a median split for years of education within the present sample to further analyze classification accuracy for raw scores. As demonstrated in Table 2, both measures’ cutoffs were able to be raised to maintain adequate sensitivity/specificity balance in the HEdu group. Specifically, a raw score cutoff of ≤26 on the VSD improved sensitivity by 10% and specificity by 9%. The same findings were unable to be replicated with the MBNT, as raising cutoffs to improve specificity resulted in lower sensitivity values. Presumably, a median split approach for percentile scores would not confer additional advantage given that such scores have already taken education into account. This presumption notwithstanding, the current study found that optimal classification accuracy was achieved when using the VSD with a cutoff of ≤5th percentile for the HEdu group, with adequate sensitivity/specifity (58%/83%). The ability to use either raw scores or percentiles with the MBNT was not found. This suggests that, despite the original education adjustment, higher education appears to

| Raw score cutoff | Sensitivity | Specificity | Percentile cutoff | Sensitivity | Specificity |
|------------------|-------------|-------------|-------------------|-------------|-------------|
| VSD              |             |             |                   |             |             |
| ≤22              | .16         | 1.00        | ≤2                | .32         | .96         |
| ≤23              | .26         | .96         | ≤3                | .37         | .91         |
| ≤24              | .32         | .96         | ≤5                | .58         | .83         |
| ≤25              | .42         | .96         | ≤6                | .58         | .74         |
| ≤26              | .53         | .87         | ≤8                | .58         | .65         |
| ≤27              | .53         | .78         | ≤10               | .63         | .65         |
| ≤28              | .74         | .65         | ≤11               | .74         | .61         |
| ≤29              | .79         | .57         | ≤12               | .79         | .52         |
| MBNT             |             |             |                   |             |             |
| ≤13              | .26         | 1.00        | ≤1                | .42         | .78         |
| ≤14              | .32         | .96         | ≤2                | .63         | .65         |
| ≤15              | .37         | .96         | ≤5                | .68         | .65         |
| ≤16              | .42         | .83         | ≤7                | .74         | .65         |
| ≤17              | .47         | .78         | ≤9                | .79         | .65         |
| ≤18              | .63         | .70         | ≤12               | .84         | .61         |
| ≤19              | .74         | .70         | ≤15               | .84         | .49         |
| ≤20              | .84         | .65         | ≤21               | .84         | .44         |
| ≤21              | .84         | .44         | ≤25               | .84         | .39         |
| ≤22              | .84         | .30         | ≤30               | .84         | .30         |
| ≤23              | .90         | .17         | ≤37               | .84         | .22         |
research with the BNT has shown that predictions about lateralization accuracy for Latino PWE. Although classification accuracy in determining seizure laterality has improved with the development of neuropsychological tests initially developed and validated in Spanish, it is clear that further development and validation of neuropsychological tests for Spanish-speaking PWE is of high importance given the overrepresented nature of epilepsy in this population compared to other groups living in the United States. Future research may investigate the importance of country of origin in the development of adequate neuropsychological norms.

SUPPLEMENTARY MATERIAL
To view supplementary material for this article, please visit https://doi.org/10.1017/S1355617720001289

CONFLICTS OF INTEREST
The authors declare no conflicts of interest. There are no sources of financial support.

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