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Dual-language testing improves bilinguals' verbal scores

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ABSTRACT

Objective: Research demonstrates that college educated, English language dominant bilinguals underperform relative to English speaking monolinguals on tests of verbal ability. We investigated whether accepting responses in their two languages would reveal improved performance in bilinguals, and whether such improvement would be of sufficient magnitude to demonstrate the same performance level as monolinguals. **Method:** Participants were college students attending the same university. Spanish-English bilinguals were compared to English speaking monolinguals on the Bilingual Verbal Ability Tests (BVAT), which include *Picture Vocabulary*, *Oral Vocabulary*, and *Verbal Analogies*. **Results:** When given the opportunity to respond in Spanish to items failed in English, bilinguals obtained significantly higher scores on all three subtests, and their performance matched that of monolinguals on *Oral Vocabulary* and *Verbal Analogies*. **Conclusion:** An “either-language” scoring approach may enable optimal measurement of verbal abilities in bilinguals. We provide normative data for use in applying the either-language scoring approach on subtests of the BVAT. We discuss the findings in the context of clinical assessment.

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The population of the USA has become increasingly bilingual. According to the U.S. Census Bureau (n.d.a), the number of people who reported speaking a language other than English at home has almost tripled in the last four decades. Hispanics make up the largest minority group in the USA, and Spanish is the most spoken language after English. Relatedly, the number of college students who identify as being Hispanic has doubled in the past two decades (U.S. Census Bureau, n.d.b).

In general, neuropsychological and psychoeducational assessment of cognitive abilities in non-native English speakers is challenging because most tests are normed on English monolingual (EM) individuals, and representative norms may not be

available in the desired language. Lack of congruency between the normative group and the examinee increases the likelihood of false positive and false negative determinations of cognitive impairments (Daugherty et al., 2017).

Studies show that Spanish-English bilingual college students score higher on verbal tests of English than on equivalent tests of Spanish, which suggests that applying EM norms to these groups may be appropriate (Fernandez et al., 2013). Yet, when compared to EMs, college-educated adult bilinguals do not perform as well.

Ardila et al. (2019) compared college educated simultaneous (born in the USA to Spanish-speaking parents and exposed to both languages from birth) to sequential bilinguals (came to the USA from a Spanish speaking country by age 10 and learned Spanish before English). Participants completed the verbal subtests of the Wechsler Adult Intelligence Scale III in English and Spanish. Both groups obtained higher Verbal IQ scores in English than Spanish. Both groups also obtained an average English Verbal IQ score of 100, which is lower than the average score of 114 found in EMs with similar education (Murray, 2009).

On the Boston Naming Test (BNT, Kaplan et al., 2001), fluent adult French/English (Sheppard et al., 2016) and Spanish-English bilinguals (Misdraji-Hammond et al., 2015) scored lower than EMs. The BNT is a neuropsychological instrument widely used to assess picture naming ability.

Acculturation-related variables have been proposed to explain the weaker performance of bilinguals. However, Misdraji-Hammond et al. (2015) found that first-generation, highly acculturated, Spanish-English adult bilinguals who were born, raised, and educated in English in the USA, do not perform as well as EMs on the BNT. Object familiarity ratings, previously shown to affect naming performance (Ferraro et al., 1998), were the same across groups. Thus, acculturation, object familiarity, and country of birth did not explain group differences.

It has also been proposed that performance differences may be due to smaller English vocabulary in individuals not living in the USA since birth. Portocarrero et al. (2007) studied college students born in non-English speaking countries who moved to the USA after age 5. In a comparison of early-arrival (arrival by age 9) and late-arrival bilinguals (arrival after age 10), the early-arrival group performed better than the late-arrival group on the Peabody Picture Vocabulary Test and the Expressive Vocabulary Test. However, in comparing the early-arrival bilinguals to EMs, the monolinguals outperformed bilinguals on these vocabulary tests.

Together, these studies reveal that college educated, English language dominant bilinguals underperform relative to EMs on tests of verbal ability. Ardila et al. (2019) state that a sensible approach to the evaluation of bilinguals may be to accept responses in both languages, i.e. an “either-language” approach. It is already documented that bilingual college students and college educated adults in the USA show stronger linguistic proficiency in English than Spanish, but it is unknown whether accepting responses in either language will reveal improved performance. It is also unknown whether an either-language scoring approach for bilinguals will reveal an increase in scores to the level of EMs. If the either-language scoring approach reveals that bilinguals match EMs in performance level, then such an approach will enable the more accurate use of EM normative data in the determination of verbal ability of bilinguals.

To explore the effects of either-language scoring, we compared Spanish-English bilinguals and EMs on three verbal tests, using scores derived from correct responses in English and from a combination of responses in English and Spanish. The goal of this study was to examine whether: (1) EMs would outperform Spanish-English bilinguals on each of the three tests administered in English; (2) accepting responses in either English or Spanish would lead to improvement in bilinguals' scores on the three tests; (3) bilinguals' and monolinguals' performance levels would be the same on the three tests when the bilinguals' performance was derived from an either-language scoring approach. Based on prior studies (e.g. Ardila et al., 2019; Fernandez et al., 2013; Misdragi-Hammond et al., 2015; Portocarrero et al., 2007), we hypothesized that monolinguals would outperform bilinguals on all three subtests administered in English, and that bilinguals would display higher scores when provided with an either-language scoring approach; however, we hypothesized that the change in scores resulting from an either-language scoring approach would not be of sufficient magnitude to match the scores of the monolingual group.

Materials & methods

Participants

EMs and Spanish-English bilinguals 18–30 years of age were recruited from Nova Southeastern University (NSU). Participants were excluded if they reported speaking Spanish only. They were also excluded if they reported speaking a language other than English and Spanish, if their self-reported knowledge of such other language(s) was greater than a few words or phrases. Participants were excluded if they reported a history of being diagnosed with any neurological (e.g. epilepsy or traumatic brain injury), psychiatric or psychological conditions (e.g. attention-deficit hyperactivity disorder, depression, anxiety). They were also excluded if they reported taking psychotropic medications or medications known to affect cognition (e.g. antiepileptics, anxiolytics, antidepressants).

Measures

Demographic Questionnaire was administered to obtain participant demographic information, parental education, and household income. This information was used to assess group equivalency on extraneous demographic variables.

Language Questionnaire was administered to determine age of second language acquisition and frequency of language usage in different settings (home, school, social settings). In addition, on this questionnaire, bilingual participants reported whether they considered themselves to be English language dominant, Spanish language dominant, or equally proficient in both languages (i.e. Balanced).

Bilingual Verbal Ability Tests (BVAT; Munoz-Sandoval et al., 1998) was administered to compare language groups on three verbal tests. The BVAT is an individually administered, standardized instrument for measuring the combination of cognitive and academic language abilities possessed by bilingual individuals. Three subtests make up the BVAT: (1) *Picture Vocabulary* is a picture naming test consisting of 58 items of

increasing difficulty; (2) *Oral Vocabulary* consists of synonyms (20 items) and antonyms (22 items); (3) *Verbal Analogies* consists of 35 items and requires the participant to report the inherent relationship between two words. Correct responses are scored as 1 and incorrect responses are scored as 0. If a participant gives more than one response, the last answer is scored as correct or incorrect and earlier responses are not scored. This procedure is followed even if a participant changes a response given much earlier in the test session. Thus, the maximum score for *Picture Vocabulary* is 58, for *Oral Vocabulary* is 42, and for *Verbal Analogies* is 35.

The BVAT comes with a computerized scoring program which provides an English Language Proficiency index, computed from the combined total score of the three verbal subtests administered in English, and a Bilingual Verbal Ability (BVA) index. To obtain the BVA, items failed in English are administered in the person's native language (Spanish in our study), to calculate the Spanish "Gain Score." Raw scores for each of the subtests in English and corresponding Spanish Gain Scores, if any, are entered into the BVAT computer program which generates Standard Scores (SS, mean of 100, SD 15). Specifically, the BVAT computer program provides SS for the English Language Proficiency index, the BVA index, and for each of the three subtests administered in English.

A feature of the BVAT is the option to select either age- or grade-based norms. We used age-based norms in this study. The BVAT standardization sample included 5,602 participants aged 5 to over 90 years. Participant groups included a kindergarten to grade 12 sample, a college/university sample, and an adult non-school sample.

Procedure

These data were collected as part of a larger study approved by the Institutional Review Board (IRB) at NSU (approval # 2016-226-NSU), investigating neural and behavioral differences between bilinguals and monolinguals on executive function tasks (Fernandez et al., 2023). The study plan was not pre-registered in a public repository.

Participants who met study criteria read and signed an IRB approved consent form and completed the questionnaires on their own. The BVAT subtests were administered by a bilingual researcher who read the questions and recorded the responses.

The tests were administered in English and Spanish to *all* participants to objectively quantify proficiency in each language because Spanish is ubiquitous in South Florida, and individuals who identify themselves as monolingual English speakers may also know Spanish. When administering the tests, we did not follow the recommended starting point (basal rules). Instead, we administered each test starting with the first item. After a participant failed eight consecutive items, that subtest was discontinued, and the next subtest was administered. The BVAT discontinue rule for *Picture Vocabulary* and *Verbal Analogies* is eight consecutive items scored as zero, and the discontinue rule for *Oral Vocabulary* is six consecutive items scored as zero. To avoid confusion during test administration, an 8-item discontinue rule was applied for all three tests. However, when test and Gain Scores were entered in the BVAT scoring program, we strictly adhered to the scoring rules in the BVAT manual. English speaking monolinguals who scored gain points on the Spanish administration were excluded from the analyses to ensure the homogeneity of this group regarding English monolingualism.

Results

Statistical analyses were conducted using IBM SPSS Version 28. Significance level was set at $\alpha < .05$, and two-tailed probabilities are reported. Analyses were conducted on raw and Standard Scores (SS). The α level was not adjusted for multiple comparisons to avoid artificially reducing statistical power (Perneger, 1998). Effect sizes, based on Cohen's d , and corresponding overlap statistic (OL%) are reported in Table 1. The OL% reflects the amount of overlap between two distributions (Zakzanis, 2001).

Demographic information

A total of 268 participants were tested. Participants who spoke a language other than English or Spanish ($n=7$), and monolinguals who gained points on the Spanish administration of the tests ($n=5$) were excluded from the analyses. Five participants did not complete the testing. Thus, results are based on 251 participants, a Monolingual Group ($n=102$) and a Bilingual Group ($n=149$).

Participants were college students attending NSU. The Monolingual Group ($M=19.08$, $SD=1.74$; Range 18–26) was younger than the Bilingual Group ($M=20.05$, $SD=3.22$; Range 18–34), $t(249) = 2.728$, $p = .007$. The ratio of males to females was similar across groups (Monolinguals 25/77; Bilinguals 30/119; $\chi^2(1, N=251) = 0.678$, $p = .410$).

Household income, reported by indicating with a checkmark next to the appropriate salary range (<5K, 5–10K, 11–20K, 21–40K, 41–60K, 61–80K, 81–100K, >100K), was similar between groups $\chi^2(8, N=251) = 13.883$, $p = .085$. Participants reported the

Table 1. Descriptive and inferential statistics for standard and raw scores for BVAT English tests, English+Spanish Gain Score tests, and Spanish Gain Scores by group.

	Monolinguals N = 102	Bilinguals N = 149					
	Mean (SD) (Range)	Mean (SD) (Range)	t	p	df	d	ol%
English BVAT Standard Scores			Between group comparison				
Picture Vocabulary	97.23 (8.08) (79–116)	90.07 (12.35) (59–120)	5.55	.001	249	.66	59
Oral Vocabulary	95.35 (10.32) (58–117)	92.19 (10.29) (64–117)	2.39	.018	249	.31	78
Verbal Analogies	101.25 (8.19) (81–118)	96.58 (9.11) (75–121)	4.16	.001	249	.54	65
English + Spanish Gain Standard Scores			Between group comparison *				
Picture Vocabulary		93.99 (10.41) (65–120)	2.77	.006	249	.34	76
Oral Vocabulary		95.70 (8.73) (77–124)	.275	.784	249	.04	100
Verbal Analogies		99.40 (8.51) (77–126)	1.77	.079	249	.23	85
Spanish Gain Standard Scores			Within-group (Bilingual group) comparison				
			English & English + Spanish Gain Score				
Picture Vocabulary		3.83 (6.34) (0–28)	7.35	.001	148	.60	62
Oral Vocabulary		3.37 (4.72) (0–21)	8.69	.001	148	.71	57
Verbal Analogies		2.76 (3.49) (0–17)	9.63	.001	148	.79	53
English BVAT Raw Scores			Between group comparison				
Picture Vocabulary	38.78 (3.32) (32–49)	36.23 (5.17) (23–52)	4.76	.001	249	.57	63
Oral Vocabulary	30.92 (4.16) (16–40)	29.65 (4.55) (16–38)	2.29	.023	249	.29	79
Verbal Analogies	23.38 (4.06) (13–30)	20.89 (4.98) (8–32)	4.36	.001	249	.54	65
Spanish Gain Raw Scores			Within-group (Bilingual group) comparison				
			English & English + Spanish Gain Score				
Picture Vocabulary		1.54 (2.56) (0–12)	7.35	.001	148	.60	62
Oral Vocabulary		1.50 (2.18) (0–10)	8.43	.001	148	.69	58
Verbal Analogies		1.54 (1.93) (0–9)	9.77	.001	148	.80	53

t = *t*-test; *p* = *p*-value; *df* = degrees of freedom; *d* = Cohen's *d*; *ol%* = percent overlap; * = comparison between Monolingual group English test scores and Bilingual group English+Spanish Gain Scores.

highest educational attainment for each parent by checking one of the following (<high school; high school/GED; some college/AA degree/technical school; college degree; graduate degree). Neither mother nor father educational level comparison revealed between-group differences [mother $\chi^2(4, N=249) = 5.495, p = .240$; father $\chi^2(4, N=247) = 9.903, p = .078$].

Most of the participants from the Monolingual Group [$n=92$ (91%)] and from the Bilingual Group [$n=83$ (56%)] were born in the USA. Bilinguals' other birthplaces included Central/South America ($n=37$), the Caribbean ($n=23$), Mexico ($n=2$), Europe ($n=2$), Asia ($n=1$) and Africa ($n=1$). The average age of second language acquisition was 7.83 years ($SD = 5.17$), and most (72.4%) learned English by age 10. With regard to self-reported language dominance, 54% of bilinguals reported being English dominant, 33% reported being equally proficient in both languages, and 13% reported Spanish dominance. At home, bilinguals split their time evenly between speaking English (spoken 50.3% of the time) and Spanish (49.7%). At school and in social settings, bilinguals spoke mostly English (95.3% and 84.6%, respectively).

English BVAT performance: between group comparisons

Groups were compared on each of the three BVAT subtests administered in English. Table 1 shows descriptive and inferential statistics for both raw and standard scores (SS) by group. Because the groups were statistically different in age, we used age as a covariate and compared the two groups on the raw (unadjusted) scores on each subtest. Analyses conducted with and without age as a covariate yielded similar results. Therefore, the reported statistical analyses were not adjusted for age.

As can be seen in Table 1, the Monolingual Group obtained higher raw and SS than the Bilingual Group on all three BVAT subtests when administered in English (*Picture Vocabulary*, $p = .001$; *Oral Vocabulary*, $p = .018$; *Verbal Analogies*, $p = .001$). Since analyses on raw and SS yielded similar results, we described only the results of SS. As can be seen in Table 1, between group comparison on *Picture Vocabulary* yielded the largest difference between the groups (medium to large effect size, $d = .66$). The overlapping region (OL%) between the distributions of scores of the two groups was 59%, which means 41% did not overlap. The next largest between group difference was observed in *Verbal Analogies*, which yielded a medium effect size ($d = .54$), and an overlapping region of 65%.

Either-language scoring performance: between group comparisons

The BVAT computer scoring program generates SS for the subtest scores in English but does not generate SS for the combined scores (English scores+Spanish Gain Scores) for each subtest. We added the Spanish Gain Scores to the corresponding test score in English and entered the total score for each subtest into the BVAT computer scoring program, which generated SS. This made it possible to compare the Bilingual Group combined score (English+Spanish Gain Score) on each test to the Monolingual Group (English scores). As can be seen in Table 1, the Monolingual Group again outperformed the Bilingual group on *Picture Vocabulary* ($p = .006$), with a small

to medium effect size, $d = .34$, and an $OL\% = 76$, which means that 24% did not overlap. However, the groups performed statistically the same on *Oral Vocabulary* ($p = .784$) and *Verbal Analogies* ($p = .079$).

Spanish Gain Scores: within group comparisons

Paired sample t -tests, as seen in Table 1, revealed that the average increase in test scores from the English only SS to the English+Spanish Gain SS was statistically significant and yielded medium to high effect sizes and relatively small regions of $OL\%$ (*Picture Vocabulary*, $p = .001$, $d = .60$, $OL\% = 62$; *Oral Vocabulary*, $p = .001$, $d = .71$, $OL\% = 57$; *Verbal Analogies*, $p = .001$, $d = .79$; $OL\% = 53$).

Exploratory analyses: bilingual group

Age of second language acquisition

To explore the relationship between age of second language acquisition (AoA) and test performance, we conducted Pearson correlations between AoA and each of the three BVAT subtests. Results revealed a negative relationship between AoA and *Oral Vocabulary* for the English only SS ($r(148) = -0.208$, $p = .011$, $r^2 = .04$) and for the English+Spanish Gain SS ($r(148) = -0.173$, $p = .036$, $r^2 = .03$). This negative relationship suggests that *Oral Vocabulary* scores decreased as AoA increased. However, Pearson correlations between *Picture Vocabulary* and *Verbal Analogies* and AoA were not significant, all p value $> .10$.

Self-reported language dominance and English BVAT performance

To explore the relationship between self-reported language dominance and test performance, we divided the bilingual group into three subgroups (English dominant, Spanish dominant, Balanced), and we compared the three subgroups' performance on each of the three BVAT subtests. Descriptive statistics for English test scores, English+Spanish Gains scores, Spanish Gains scores, and Raw scores can be found in Table 2.

Between group comparison on *Picture Vocabulary* SS revealed a main effect of group, $F(2, 145) = 26.489$, $p < .001$, $\eta_p^2 = .268$. Post hoc comparisons revealed that English dominant bilinguals scored higher than Spanish dominant, $p < .001$, and Balanced bilinguals, $p = .002$. Additionally, the Balanced bilingual group outperformed the Spanish dominant group, $p = .002$.

Between group comparison on *Oral Vocabulary* SS revealed a main effect of group, $F(2, 145) = 10.095$, $p < .001$, $\eta_p^2 = .122$. Post hoc comparisons revealed that English dominant, $p < .001$, and Balanced bilinguals, $p = .003$, outperformed Spanish dominant bilinguals. However, the English dominant group and the Balanced group performed similarly, $p = .516$.

Between-group comparison on *Verbal Analogies* revealed a group main effect, SS $F(2, 145) = 20.510$, $p < .001$, $\eta_p^2 = .221$. Post hoc comparisons revealed that English dominant and Balanced bilinguals outperformed Spanish dominant bilinguals, (p value $< .001$), and the English dominant group and the Balanced group performed similarly, $p = .08$.

Table 2. Descriptive statistics for standard and raw scores for BVAT English tests, English + Spanish Gain Score tests, and Spanish Gain Scores grouped by bilingual self-reported language dominance.

	English Dominant N=80	Spanish Dominant N=19	Balanced N=49
Bilinguals	Mean (SD) (Range)	Mean (SD) (Range)	Mean (SD) (Range)
English BVAT Standard Scores			
Picture Vocabulary	94.86 (10.38) (71–120)	75.68 (10.67) (59–98)	88.20 (10.89) (66–116)
Oral Vocabulary	95.44 (8.42) (77–111)	80.68 (9.30) (64–100)	91.76 (9.94) (75–117)
Verbal Analogies	98.65 (9.00) (80–116)	88.89 (8.70) (75–105)	96.53 (7.57) (78–121)
English+Spanish Gain Standard Scores			
Picture Vocabulary	95.74 (10.48) (71–120)	91.21 (9.27) (65–107)	92.33 (10.46) (74–119)
Oral Vocabulary	96.38 (8.47) (77–116)	91.84 (9.32) (78–113)	96.08 (8.79) (83–124)
Verbal Analogies	100.16 (8.70) (83–120)	96.84 (9.18) (77–114)	99.33 (7.87) (81–126)
Spanish Gain Standard Scores			
Picture Vocabulary	0.88 (1.84) (0–8)	15.53 (7.20) (0–28)	4.12 (5.43) (0–26)
Oral Vocabulary	0.94 (1.61) (0–7)	11.16 (5.21) (2–20)	4.33 (4.36) (0–21)
Verbal Analogies	1.51 (2.12) (0–10)	7.95 (4.97) (1–17)	2.80 (2.72) (0–12)
English BVAT Raw Scores			
Picture Vocabulary	38.18 (4.53) (29–51)	30.42 (4.19) (23–39)	35.47 (4.55) (27–46)
Oral Vocabulary	31.02 (4.08) (16–38)	25.16 (3.66) (20–33)	29.29 (4.39) (21–38)
Verbal Analogies	22.01 (4.84) (10–30)	16.68 (4.78) (9–25)	20.86 (4.31) (8–32)
Spanish Gain Raw Scores			
Picture Vocabulary	0.35 (0.73) (0–3)	6.26 (3.07) (0–12)	1.55 (2.01) (0–9)
Oral Vocabulary	0.39 (0.67) (0–3)	4.89 (2.47) (1–10)	1.84 (1.83) (0–9)
Verbal Analogies	0.80 (1.12) (0–5)	4.53 (2.72) (1–9)	1.51 (1.36) (0–6)

Either-language scoring performance of bilingual subgroups

Comparison of the three bilingual subgroups on the English+Spanish Gain Scores did not reveal group differences on any of the three tests, all p value > .08.

Discussion

The goal of this study was to determine whether Spanish-English bilingual college students with high English proficiency would demonstrate improved English BVAT scores when given the opportunity to respond to test items in either of their two languages, and if so, whether the observed improvement in scores would be of sufficient magnitude that they would demonstrate the same performance level as a monolingual comparison group.

Indeed, the use of an either-language scoring approach was associated with significantly higher scores on all three tests, compared to scores obtained when examinees were permitted to respond in English only. Moreover, when using this combined scoring approach, bilinguals performed statistically the same as monolinguals on *Oral Vocabulary* and *Verbal Analogies*, although not on *Picture Vocabulary*. Between-group comparison for English responses revealed a monolingual advantage on all three tests. Our findings support Ardila et al. (2019) recommendation to test bilinguals in two languages. The findings also suggest that this either-language scoring approach may lead to more precise determination of verbal ability and may enable the valid use of EM norms when evaluating verbal ability in bilinguals.

Studies comparing language groups in *naming ability*, consistently show a monolingual advantage (Gollan et al., 2005; Sullivan et al., 2018), even when bilinguals are assessed with an either-language scoring approach (Sheppard et al., 2016). Other

research reveals that language tasks requiring semantic knowledge of words and less language-specific lexical knowledge are less vulnerable to the effects of bilingualism (Gollan et al., 2005). Consistent with this, in our study, when provided with an either-language scoring approach, bilinguals underperformed relative to monolinguals on picture naming ability (*Picture Vocabulary*); interestingly, performance was not correlated with age of second language acquisition, suggesting that other factors account for this lower performance.

The bilingual disadvantage on naming tests has been explained by a “weaker links” or “frequency-lag” hypothesis, which states that bilinguals maintain access to twice as many lexical items (words in English *and* Spanish) as monolinguals (words in English only) and split their time using their two languages. Thus, they spend less time strengthening links specific to each language (Gollan et al., 2005). It has also been proposed that lower picture naming scores in bilinguals are due to linguistic competition between the two languages (Sullivan et al., 2018), and support for this is seen in studies demonstrating that both languages are always active and competing in the brain (Kroll et al., 2014).

The disadvantage on naming tests may be related to differential neural organization in bilinguals compared to monolinguals. Research on epilepsy patients (Gooding et al., 2018) revealed that left hemisphere seizure patients were more likely to be impaired on naming tests, which is an expected finding based on the left hemisphere’s usual structure and functional relationship to language, but this finding was only seen in monolingual patients. For bilinguals, no association between laterality of seizures and naming performance emerged. It may be that in bilinguals, language processing occurs in more distributed areas of the brain than in monolinguals (Bartha-Doering & Bonelli, 2019).

Implications for clinical practice

Naming ability is often evaluated as part of a neuropsychological assessment, as deficits may be found in normal as well as abnormal aging (Georgiou et al., 2022). Previous research has established that bilinguals who are highly proficient in English benefit from either-language administration (Sheppard et al., 2016). The current study extends these findings, by revealing that when assessed using an either-language scoring approach, bilinguals’ scores on tests of naming ability improve, but not to the same level as monolinguals. Thus, lower scores on naming tests may not be due to the language of test administration or the scoring approach, but instead to a stable effect of bilingualism. These findings suggest that in clinical assessments of bilinguals, caution is warranted in the interpretation of low scores on naming tests. Low scores on such tests are vulnerable to false positive determinations of language impairment.

The current study also reveals that on more semantically loaded language tasks (e.g. tasks requiring the demonstration of word knowledge such as required by *Oral Vocabulary*), bilinguals benefit significantly from an either-language scoring approach to such a degree that, in this study, their scores were statistically the same as the monolinguals’ scores. In clinical assessments of bilinguals’ vocabulary and ability to conceptualize similarities (i.e. *Verbal Analogies*), low scores are vulnerable to incorrect

interpretations as being impaired. However, this may be ameliorated or remedied by applying an either-language scoring approach.

The exploratory analyses in this study suggest that all bilinguals, including balanced bilinguals, may benefit from an either-language scoring approach, and that individuals with lower English proficiency will benefit the most. These findings are particularly relevant to clinicians assessing a bilinguals' total verbal ability (i.e. their "combined-languages" ability).

This study provides normative data for use in applying the either-language scoring approach on the subtests of the BVAT. The norms, provided for EMs and Spanish-English bilinguals (Table 1), include standardized scores and raw scores for the combined English+Spanish Gain Scores for each of the BVAT subtests. These data supplement the norm-based standard scores provided by the BVAT computerized scoring program (the BVAT norms are provided through the scoring program only and not *via* printed media). These norms are applicable particularly to the evaluation of college-educated Spanish-English bilinguals.

Limitations and future directions

This study evaluated English-dominant, highly educated Spanish-English bilinguals, and therefore, generalizability of these findings may be limited to such populations. Future research should consider evaluating bilinguals with different levels of linguistic proficiency and educational attainment. The BVAT is available in several languages, and it would be useful to replicate and extend the findings to bilinguals who are native speakers of other languages (English/Portuguese, English/Italian) with the goal of determining whether administration in both languages yields similar performance to monolinguals which will permit the application of EM norms to bilingual populations. This study examined (in the exploratory analyses) the relationship between self-reported language dominance (i.e. English dominant, Spanish dominant, Balanced), and performance on BVAT subtests. Interestingly, the bilinguals' self-reported language dominance corresponded to their English BVAT scores, with self-identified Spanish dominant group obtaining the lowest scores, and self-identified English dominant group obtaining the highest English BVAT scores, suggesting that their self-assessment was consistent with their performance in English. Future studies should replicate these findings, and additionally, objectively quantify language dominance and its relationship to self-reported dominance.

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