influenced by the knowledge of another language and that this effect seems to be mediated by how balanced the bilingual is.

Keywords
Cognate effect, bilingualism, Spanish, Boston Naming Test, bilinguals

A cognate has been defined as "a word in one language which is similar in form and meaning to a word in another language because both languages are related" (Richards & Schmidt, 2002, p. 829) (e.g., English *flower*, Spanish *flor*). Cognates can share phonological and/or orthographic form, and typically are related semantically although they are not always translation equivalents (Hall, 2002). Two different types of true cognates have been distinguished: (a) words that are phonologically similar and orthographically identical (English *dental* – Spanish *dental)*, and (b) words that are phonologically similar but orthographically different (English *minute* – Spanish *minuto*) (Rodriguez, 2001). There are also so-called false cognates in which words are phonologically and orthographically similar but their meaning is different, such as *éxito* (which means success in Spanish) and English *exit.*

"Cognate facilitation effect" refers to the advantage cognate words have over non-cognates in speed of recognition and production of words during language tasks. Multiple authors have demonstrated this effect in bilinguals (for a review, see Costa, Santesteban & Caño, 2005). The effect has been observed in different oral and written tasks such as reading (Van Assche, Duyck, Hartsuiker & Diependaele, 2009), naming (Gollan, Fennema-Notestine, Montoya & Jernigan, 2007) and translating (Duñabeitia, Perea & Carreiras, 2010). Duñabeitia, Perea, & Carreiras (2010) have proposed that although cognates automatically activate a common conceptual (lexical-semantic) node in bilinguals, this activation is modulated by level of proficiency. Studies have found the cognate effect in diverse pairs of languages, including Spanish–English (Bravo, Hiebert & Pearson, 2007; Gollan et al., 2007; Mendez-Perez, Peña & Bedore, 2010), Italian–English (Siyambalapitiya, Chenery & Copland, 2009), French–English (Roberts & Deslauriers, 1999), Dutch–English (Brenders, van Hell & Dijkstra, 2011; van Hell & De Groot, 1998), Russian–English (Sherkina, 2003), German–English (Blumenfeld & Marian, 2005), and Bulgarian–English (Janyan & Hristova, 2007). The present study focuses on the cognate effect in Spanish–English bilingual adults performing a confrontation naming task.

Because of the significant number of words with a Latin origin existing in English, it is not surprising to find a large number of cognate words when comparing English and Spanish. Méndez-Pérez et al. (2010) studied the ability to recognize English cognates of Spanish words in Spanish–English bilingual kindergarten and first grade children, and whether the ability to recognize cognates changed the score on a measure of English vocabulary. The authors selected 89 bilingual children and administered the Test of Language Development-Primary: 3 (TOLD-P: 3) Picture Vocabulary Subtest (Newcomer & Hammill, 1997). Sensitivity to cognate status was related to the amount of language exposure. It was suggested that there was a transfer of vocabulary knowledge from the students' first language (Spanish) to receptive vocabulary in English. The authors concluded that children as early as kindergarten are sensitive to the Spanish–English cognate effect.

Kohnert, Hernández and Bates (1998) selected 100 young educated bilingual adults and administered the Boston Naming Test (BNT) (Kaplan, Goodglass, & Weintraub, 1983) in both Spanish and English. Test scores were calculated in three different ways: English only, Spanish only, and a composite score indicating the total number of items correctly named independent of language. As a whole, responses were significantly more accurate in English than in Spanish.

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For a subset of the larger group (n = 25) there were significant differences in composite over single language scores, but no significant differences between Spanish and English. Much greater variability in responses over the Spanish items was found for this Spanish–English bilingual group.

Differences in naming ability have been described in individuals that speak more than one language when compared to monolinguals. Some studies have shown, for example, that compared to monolinguals, bilinguals present more "tip of the tongue" retrieval problems (Gollan & Acenas, 2004; Gollan, Bonanni, & Montoya, 2005); bilinguals also generate fewer words in semantic fluency tasks (Rosselli et al., 2000) and name fewer pictures in each language on standardized naming tasks such as the BNT (Roberts, Garcia, Desrochers, & Hernandez, 2002).

Gollan and Acenas (2004) showed that retrieval problems in bilinguals can be associated with the cognate status of the target word. Fewer retrieval problems were seen when trying to retrieve cognates than when the words had dissimilar names across languages (non-cognates). More recently, Gollan et al. (2007) selected 29 aging Spanish–English bilinguals and administered the BNT, first in their dominant language and then in their less-dominant language. Bilinguals with similar naming scores in each language, or relatively balanced bilinguals, named more pictures correctly when credited for producing a correct name in either language. These participants also named fewer pictures in their dominant language than non-balanced bilinguals, and they named more pictures correctly in both languages if the pictures had cognate names. Non-balanced bilinguals did not benefit from the alternative scoring procedure and showed cognate effects only in their non-dominant language. The authors concluded that the bilinguals' ability to name pictures reflects their experience with word forms in both languages.

Different theoretical explanations have been proposed to account for the cognate facilitation effect in bilinguals. It has been suggested that cognates generate phonemic activation in the target word simultaneously in both languages (Costa et al., 2005). Alternatively, it has been proposed that the activation in one language creates a cascade of events originating in the phonological system (see Costa et al., 2005, for a review).

In order to further understand language representation in bilinguals, it is crucial to identify those factors that enable the cognate facilitation effect and how this effect is manifested in each language. The present study investigated whether naming ability is affected by the cognate status of the target words in a picture-naming task when using a relatively large sample of Spanish–English bilinguals. It further attempted to determine whether the cognate facilitation effect has the same influence in the preferred and non-preferred languages of balanced and non-balanced bilinguals. An additional purpose of this study was to determine whether the cognate effect is influenced by the order in which the language of the naming test is administered. It is possible that the cognate facilitation effect in the non-preferred language is stronger when the naming task in this language is preceded by the same task in the preferred language. In this study we assigned the naming task in Spanish first to half of the sample and in English to the other half.

Finally, we investigated whether the performance of bilinguals with different levels of language proficiency is affected by different scoring systems ("either language", "both languages", and "dominant language") of the Boston Naming Test (BNT), the confrontation naming task used in this study. For example, Gollan et al.'s (2007) preliminary analyses suggest that balanced Spanish–English bilinguals benefit more from the "either language" scoring system than the "dominant language" score. This study also attempts to replicate, in a larger sample with a broader age range, the preliminary results presented by Gollan et al. (2007).

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Methods

Participants

The initial sample consisted of 117 bilingual South Florida residents who were college students and other members of the community (mean age 42.56 years, SD = 19.09; mean education level 15.80 years, SD = 3.02). All participants reported no pathological antecedents (cardiovascular, psychiatric or neurological diseases), and all of them reported good health with normal or corrected-to-normal visual acuity. College participants received extra credit points in a psychology course for their participation in the study; other participants received a $10.00 gift card. Three participants were excluded from the analysis because information on them was missing, three did not complete the English BNT, and three scored below the cut-off score for inclusion on the self-rated questionnaires of language proficiency or in the Block design subtest of the Wechsler Adult Intelligence Scale III (WAIS-III) (Wechsler, 1997). The remaining 108 participants were divided into balanced and non-balanced groups based on median split for the absolute score difference between the BNT administered in English and Spanish. Bilingual participants with a BNT score difference lower than the group median (10 points) entered into the balanced group (n = 50; 31 females, four left-hander, two ambidextrous) and those with a difference score higher than 10 entered into the non-balanced group (n=53; 35 females, five left-handers). Five participants with a difference score equal to the median were excluded from the analysis. Therefore, the final sample that was analyzed included 103 participants.

Assessment of bilingualism

To determine language history and degree of bilingualism, a language background questionnaire was administered including information about language usage while growing up, recent language use, current language preference, age of second language acquisition, and method of second language acquisition (see Table 1).

The bilingual participants also completed a five-point rating scale on how well they understood and spoke each of their two languages (Rosselli et al., 2000; Rosselli et al., 2002). Significant correlations between self-rating questionnaires of language proficiency and actual language proficiency have been previously reported (Hakuta, Bialystok, & Wiley, 2003). Only participants that rated themselves as able to understand and speak both Spanish and English "relatively well", "quite well", or "excellently" were selected.

There is no accepted definition of a "balanced bilingual", but it is frequently assumed that in most apparently balanced bilinguals relative dominance of one of the two languages can be observed depending upon the specific context (Ardila, 2007). Following Kohnert et al. (1998), Rosselli et al. (2002), Gollan et al. (2007), and Salvatierra and Rosselli (2010), the scores in the English and Spanish versions of the BNT (Kaplan et al., 1983) were used as a criterion of language mastery.

All participants considered themselves of Hispanic origin and reported Spanish as their first language. However, only 66 marked Spanish as the preferred language, 32 indicated English as the preferred language and five marked both English and Spanish as equally preferred. The countries of origin were diverse: 25% of the sample was born in the United States of America, 40.7% in South America, 17.5% in the Commonwealth of Puerto Rico, 10.7% in Cuba, 5% in Continental Central America, and 2% in the Dominican Republic.

The two bilingual groups did not differ in age or years of education (see Table 2). The balanced bilinguals significantly differed from the non-balanced group on the total scores of the English

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Table 1. Frequencies of responses (in percentages) in the language background questionnaire to questions related to "percentage of time used in the last 10 Years, and while growing up".

Variable	Balanced					Non-balanced				
	0–20	21–40	41–60	61–80	81–100	0–20	21–40	41–60	61–80	81–100
In the last 10 years, what percentage of time did you use English/Spanish?										
English	0	8	38	40	14	6	17	30	30	17
Spanish	6	28	22	48	24	0	23	21	21	36
While growing up, what percentage of the time did you use English/Spanish at home?										
English	74	8	6	25	2	74	8	4	9	6
Spanish	4	6	10	10	70	9	6	4	8	74
While growing up, what percentage of the time did you use English/Spanish at school?										
English	22	8	12	22	36	32	9.4	6	19	34
Spanish	20	16	12	22	30	28	15	4	11	42
While growing up, what percentage of the time did you use English/Spanish in the community?										
English	32	8	26	16	18	40	17	11	15	17
Spanish	16	6	22	20	36	13	11	17	9	49
While growing up, what percentage of the time did you use English/Spanish in general										
English	24	10	22	32	12	37	11	25	8	19
Spanish	6	8	22	28	36	13	9	17	11	49

Table 2. Characteristics of the sample.

Variable	Balanced	Non-balanced	*F*	*P*	$p\eta^2$
	Mean (SD)	*Mean (SD)*			
Age	43.90 (18.22)	41.23 (19.97)	.502	.480	.005
Years of schooling	15.68 (2.55)	15.92 (3.49)	.163	.687	.002
Age acquiring English	16.46 (14.97)	15.89 (13.87)	.041	.841	.000
Level of language proficiency					
Understand[a]					
English	4.56 (.787)	4.26 (.812)	3.52	.060	.034
Spanish	4.86 (.351)	4.68 (.644)	3.08	.082	.030
Speak[a]					
English	4.38 (.780)	4.00 (.941)	4.95	.028	.047
Spanish	4.74 (.565)	4.57 (.747)	1.76	.182	.017
Read[a]					
English	4.32 (.891)	4.09 (1.00)	1.44	.232	.014
Spanish	4.70 (.505)	4.49 (.891)	2.12	.148	.021
Write[a]					
English	4.24 (.822)	3.79 (1.08)	5.54	.020	.052
Spanish	4.44 (.73)	4.11 (1.12)	3.02	.085	.029

[a]Self-ratings of language proficiency in understanding, speaking, reading and writing on a scale of 1–5, with 1 being "virtually nothing", 2 "limited", 3 "relatively well", 4 "quite well", 5 "excellent".

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language proficiency questionnaire; this score was obtained by adding together the understanding, speaking, reading and writing scores presented in Table 2, F (1,101) = 4.49, p = 0.036, pη2= .04. The language groups did not significantly differ in the total scores for the Spanish language proficiency questionnaire, F (1,101) = 3.22, p = 0.076, pη2= .031. The group difference in the total scores for the English and the Spanish proficiency language questionnaires was statistically significant, F (1,101) = 11.32, p = 0.001, pη2= .101; the balanced group had a mean score difference of 2.72 (SD=2.88) while the non-balanced group difference was 3.74 (SD=3.15), indicating a difference between the two groups in their perception of their own proficiency in each of the languages. The scores in the English and Spanish proficiency questionnaires by subsections are shown in Table 2.

The specific frequencies of responses for the percentage of English and Spanish used for the two language groups during the last 10 years and while growing up are presented in Table 1. All bilinguals reported active use of both languages in the last 10 years and while growing up, but differences on the relative use of each language were observed. For example, 27% of the balanced group and 15% of the non-balanced group reported the use of English at home from 61 to 100% of the time while growing up, while 80% of the balanced and 82% of the non-balanced reported the use of Spanish for the same proportion of time.

To ensure equivalent non-verbal cognitive capacities, all participants were required to obtain a scaled score equal to seven or higher on the Block Design subtest from the WAIS-III. There were no between-group differences on this test, F (1, 101) = 0.009, p = 0.92, pη2= .000.

Testing procedure

Informed consent was obtained from all participants in accordance with APA Ethical Guidelines for research with human subjects. The demographic and language proficiency questionnaire was administered to determine the person's level of bilingualism. Participants then completed the WAIS-III Block Design subtest. Individuals who scored below seven (one standard deviation below the mean) did not receive further testing. Two participants were excluded. Half of the bilingual participants proceeded with the English BNT and half with the Spanish BNT.

They were tested by a proficient Spanish–English bilingual examiner. Participants were asked to name all pictures in the BNT (Kaplan et al., 1983), first in one language and then in the other language. Naming trials were administered according to the standardized instructions except that participants were asked to name pictures starting at item 28 instead of item 30 to include two additional non-cognates; credit was given to the previous pictures if correct naming was seen on the next 10 consecutive pictures (item 37). If errors were seen, the examiner went back to previous pictures until the participant named eight consecutive correct pictures. As recommended by Kohnert et al. (1998), testing was not discontinued after eight failed naming trials (Gollan et al., 2007).

Scoring methods in the BNT

For each participant, four BNT scores were obtained: total correct in the preferred and non-preferred language, total score in both languages (i.e., the item correctly named both in Spanish and English) and total correct using either language (points are given in each item that is correctly named in either English or Spanish) (Table 3).

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Table 3. Boston Naming Test (BNT) and cognate results by language group and by language preference.

Variable	Balanced	Non-Balanced	*F*	*p*	pη²
	Mean (SD)	*Mean (SD)*			
Total score BNT					
English	49.10 (7.18)	41.91 (10.23)	16.87	.0001	.143
Spanish	50.10 (6.59)	44.68 (10.80)	9.31	.003	.084
Total score BNT					
Preferred language	50.72 (6.40)	50.81 (6.16)	.005	.941	.000
Non-preferred language	48.42 (7.22)	35.77 (8.48)	65.90	.000	.395
BNT either language	53.80 (5.07)	52.69 (4.05)	1.49	.225	.015
BNT both languages	44.72 (7.99)	35.31 (6.95)	26.70	.000	.312

Cognates and non-cognates in the BNT

It has been estimated that about half of the BNT items have Spanish–English cognate names. For comparison purposes, we used a cognate classification very similar to the one presented by Gollan et al. (2007). We used 12 cognates with a mean item number (position in the BNT) of 44.25 (SD = 10.72) matched to 12 non-cognates (following Gollan et al., 2007) with a mean item number of 43.83 (SD = 11.05), $t = 1.10$, $p = .295$).The mean item number in our study is 10 points higher than the item number mean in Gollan et al.'s because, contrary to Gollan et al. who started at item one, our test administration started at item 28 and went to 60. All items above 28 were given to all participants. As stated above, credit was given to the previous pictures if correct naming was seen on the next 10 consecutive pictures. The appendix presents the cognate and non-cognate items of the BNT that were used in this study for all participants.

Statistical procedures

The following statistics were used: 1. One way ANOVA was initially used to compare the two language groups (balanced/non-balanced) on the different BNT scores. 2. A 2 (balanced/non-balanced) × 2 (preferred/non-preferred language) repeated measures General Linear Model (GLM) was performed to analyze the effects and interactions of language group and language preference on the BNT scores. 3. A 2 (balanced/non-balanced) × 2 (preferred/either language scoring method) repeated measures GLM was employed to analyze the effects and interactions of language group and scoring methods on the BNT scores. 4. The cognate effect in the two language groups was tested using a 2 (preferred/non-preferred) × 2 (balanced/non-balanced) GLM repeated measures. 5. The influence of the order in which the language of the BNT was administered was analyzed using a between-group (English first vs. Spanish first) univariate GLM analysis for each of the language groups. Unimodal ANOVAs were used to do post hoc analyses. The effect sizes were assessed using partial eta² (pη²) for overall group differences.

Results

BNT scores

Group comparisons of the balanced versus non-balanced bilinguals using a one-way ANOVA are shown in Table 3. The two groups significantly differed on the Spanish and English BNT scores

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with the balanced bilinguals showing a superior performance in both cases. However, no difference in the number of pictures named was observed between the two language groups when the scores in the preferred language were used, suggesting similar proficiency of both groups in this language. However, the less balanced bilinguals showed significantly lower performance in the naming tasks when the non-preferred language was used. A significant interaction between language group and language preference, F (1, 101) = 75.15, p = .0001, $p\eta^2$ = .43), shows that whereas the balanced group seems to have a strong vocabulary in both the preferred and the non-preferred languages, the non-balanced group demonstrates a clear dominant language for picture-naming. On average, the difference in the balanced group between the naming score in the preferred and non-preferred languages is 2.30 points. This difference in the non-balanced group reached 15.04 points.

Scoring method

The 2 (balanced/non-balanced) × 2 (preferred language vs. either language scoring methods) repeated measures GLM shows a significant main effect for the BNT scoring method (F (1, 101) = 39.11, p = .0001, $p\eta^2$ = .279) with no significant group effect (F (1, 101) = .25, p = .6171, $p\eta^2$ = .002). The interaction between group and method does not reach significance either (F (1, 101) = 2.25, p = .136, $p\eta^2$ = .022). Either language scoring method is superior to the preferred language score in both groups. The balanced bilinguals and the non-balanced bilinguals benefit from being given the option to name a picture in either language. The balanced group improved the score by three points and the non-balanced group improved by two points when the score includes correct responses in either English or Spanish. Also, as shown in Table 3, the lowest score is reached when the "both languages" score (total of correct items in both languages) is used.

Cognate analyses

Two different aspects of cognate naming were analyzed: 1. The proportion of correct cognates named was obtained by dividing the total number of correctly named cognates by 12 (the maximum possible number of correctly named cognates). As shown in Table 4, approximately 80% of the cognates are named correctly in both bilingual groups in the preferred language, and also in the

Table 4. Proportion of correct cognates and non-cognates by language group and language preference.

Variable	Balanced	Non-balanced	F	p	$p\eta^2$
	Mean (SD)	*Mean (SD)*			
Cognates (preferred)	.82 (.15)	.80 (.16)	.186	.667	.005
Cognates (non-preferred)	.81 (.18)	.61(.20)	17.53	.0001	.192
Non-cognates (preferred)	.52 (.27)	.54 (.25)	.333	.565	.000
Non-cognates (non-preferred)	.42 (.31)	.17 (.13)	13.04	.001	.176
Cognate effect (preferred)	.31 (.22)	.26 (.19)	1.11	.294	.01
Cognate effect (non-preferred)	.38 (.24)	.50 (.19)	5.47	.022	.06

Note. Proportion of cognates = total number of correctly named cognates/12; Proportion of non-cognates = total number of correctly named non-cognates/12; Cognate effect = total proportion of cognates minus total proportion of non-cognates.

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non-preferred language in the balanced group. The non-balanced group, however, names correctly only 61% of the cognates in the non-preferred language. For comparison purposes the proportion of non-cognates was also calculated in a similar manner. In this analysis, the percentage of correct non-cognates is close to 50% for both groups in the preferred language but only 17% for the non-balanced group in the non-preferred language. 2. The cognate effect was calculated for each participant by subtracting the total proportion of non-cognates from the total proportion of cognates following Gollan et al.'s (2007) procedure; as indicated in Table 4 this effect is around 28% in the preferred language for both groups and 38% and 50% in the non-preferred language for the balanced and non-balanced groups respectively. This means that more correct cognates than non-cognates are named in the non-preferred language in the non-balanced group; since the level of difficulty of the cognates and non-cognates is equivalent, the higher the score difference, the larger the facilitation effect of cognates.

To test the main effects and interactions of language preference and bilingual group on the proportion of correctly named cognates, a repeated measures multivariate GLM was used comparing the total proportion of cognates in the preferred language with the total proportion of cognates in the non-preferred language using language group as the between factor. Results showed a significant language (preferred vs. non-preferred), F (1, 101) = 36.08; p = .000; p pη²2 = .271, and group effects, F (1, 101) = 11.58; p = .001; p pη²2 = .107. A higher percentage of correct cognate naming is observed in the preferred language and in the balanced group. However, there is a significant interaction between language and group, F (1, 101) = 28.32; p = .001; p pη² = .22. The balanced bilinguals show a similar percentage of cognates named in both the preferred language and the non-preferred language, F (1,100) = 2.09, p = .152, pη² = .030, whereas the non-balanced bilinguals correctly named significantly more cognates in the preferred language than in the non-preferred language, F (1,100) = 13.75, p = .000, pη² = .166.

The effect of order of administration on the cognate effect was explored with an additional repeated measures multivariate GLM comparing the total number of cognates named in the preferred language with the total number of cognates in the non-preferred language using order of administration (English first vs. Spanish first) as the between factor. The order of administration was not significant for either the total number of cognates named in the preferred language, F (1, 100) = .948; p = .334; pη² = .013, or in the non-preferred language, F (1, 100) = .355; p = .553; pη² = .005.

Facilitation effect of cognates

To further analyze the facilitation effect of cognates and to replicate Gollan et al.'s (2007) procedure, we analyzed the cognate effect in the preferred and non-preferred languages for both groups. Another repeated measures multivariate GLM was used to compare the cognate effect score in the preferred language to the cognate effect score in the non-preferred language, using language group as the between factor. Main effects are observed for the preferred language, F (1,100) = 20.81, p = .000, pη² = .248, that significantly interacted with the language group, F (1,100) = 13.14, p = .001, pη² = .0173. A higher cognate effect is observed in the non-balanced bilingual in the non-preferred language naming task.

Discussion

The present study analyzed the cognate effect in a relatively large sample of balanced and non-balanced Spanish–English bilinguals when performing a standardized confrontation naming task.

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Both bilingual groups correctly named more cognates than non-cognates independently of the target language. However, this main cognate effect interacted with the type of bilingualism; balanced bilinguals produced cognates in similar proportions in both languages, whereas the non-balanced group named significantly more cognates in the non-preferred language than in the preferred language. The cognate effect (proportion of cognates subtracted from the proportion of non-cognates for words named accurately) was larger in the non-balanced bilinguals when the naming task was performed in the non-preferred language. These effects were independent of the order in which the Spanish and English forms of the BNT were administered, suggesting no priming effect.

Several studies have shown the positive effects of cognates in bilingual speakers in the speed with which cognate words are named (e.g., Costa, Caramazza, & Sebastián-Gallés, 2000), translated (Duñabeitia et al., 2010) and read (Van Assche et al., 2009). The cognate effect described in the current results reflects an additional positive effect: that of cognate transfer in recalling names of objects. As mentioned in the introduction, at least two mechanisms have been proposed to explain this transfer: the first mechanism suggests that cognates generate phonemic activation in the target word not just in the intended language (i.e. Spanish *pirámide*) but also of its translation in the non-response language (i.e. English *pyramid*) (Costa et al., 2005). In contrast, the second proposed mechanism includes the activation of a lexical system but in terms of a cascade of events originated in the phonological system. That is, not only would any activated lexical representation (regardless of the language it belongs to) spread some activation to its corresponding phonological segments, but these segments would also send back some activation to all words with which they are connected. This mechanism assumes bidirectional activation from the lexical system to the phonological forms of the words. As reported by Costa et al. (2005) there is evidence that in a confrontation naming task in one language there is phonological activation of the target's translation in the non-response language.

Our results also support Gollan et al.'s (2007) cognate facilitation effect asymmetry, in which a stronger cognate effect is found in the non-dominant rather than the dominant language. Other authors have also reported similar asymmetrical findings in naming tasks. For example, Costa et al. (2000) reported that Catalan–Spanish bilinguals named the pictures with cognate names faster than the pictures with non-cognate names. This effect, although observed in both languages, was larger in the participants' non-dominant language. Similar findings have been reported in children by Kelley and Kohnert (2012) and Méndez-Pérez et al. (2010). These authors have suggested that a possible explanation for this effect being more robust in the less dominant language is that the dominant language produces stronger activation at the phoneme level, facilitating the access of the phonemes that are needed to produce words in both languages (Gollan et al., 2007). This phonemic activation is achieved by the simultaneous selection of the target lexical node in the response language and its transformation in the non-response language (Costa et al., 2000). The level of activation of these lexical nodes in the dominant language is stronger than the one in the non-dominant language. Therefore, according to Costa et al. (2000), when a bilingual individual names a picture with a cognate name in the non-dominant language, the great activation received by its translation in the dominant language spreads to its phonological components, helping the retrieval of the target phonological units in the non-dominant language. When the naming task is performed in the dominant language, the activation that is sent to the phonological segments of its translation in the non-dominant language is not as significant as if the naming starts in the non-dominant language. Costa et al. (2000) suggest that the reason why the effect of having a cognate translation is larger when naming in the weaker language is because the connection between semantic representations and their corresponding lexical nodes is stronger for the dominant language than it is for the non-dominant language.

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In contrast to Gollan et al.'s study, the balanced bilinguals in the current study also showed the cognate effect. Inconsistency of results may be due to differences in the demographic characteristics of the two bilingual samples. Our sample was on average 30 years younger and had on average four more years of formal education. In addition, the mean BNT score of our balanced bilingual sample was 50 in the preferred language and 48 in the non-preferred language, while in the other study these means were 47.7 and 40.2 respectively. The BNT scores suggest that our sample was more proficient than the sample in Gollan et al.'s study. Level of proficiency in bilinguals has been associated with differences in the degree of communication between the two languages. More proficient bilinguals have independence in the functioning of each language, whereas less proficient bilinguals use their native language as a vehicle to learn the second language. Other possibilities for the differences between our results and Gollan's could be the nature of the items – this study included higher level items (more difficult) which may be less frequent in the language and so the cognate effect could be a result of the less frequent items. Another possibility is related to the participants' current use of each language. It may be that while some have balanced proficiency they use English (or Spanish) more often on an everyday basis due to academic or work demands.

The current results clearly demonstrate that the retrieval of words in the BNT is influenced by the knowledge of another language and that this effect seems to be mediated by how balanced the bilingual is. The size of the vocabulary in the balanced and non-balanced bilinguals of this study depended on the language the participants were tested on. Balanced bilinguals obtained very similar scores in both the preferred and the non-preferred language (50.72 and 48.42), whereas the difference between languages was considerably larger in non-balanced bilinguals (50.81 and 35.77). Nonetheless, the naming ability was almost identical in both groups when only the preferred language was considered (50.72 and 50.81). It can be conjectured that our results can be generalized to different naming tasks and are not specific to the BNT.

Naming ability was significantly affected by the procedure used to calculate the naming score. Although balanced bilinguals obtained a similar naming score in both languages regardless of language preference (about 48–50), and this score was similar to the score found in the preferred language for non-balanced bilinguals (about 50), this naming score was still two to three points below the naming score obtained when names in either language were accepted (about 52–53). This observation suggests that even in non-balanced bilinguals, both languages must be used to calculate the size of an individual's vocabulary. Significant educational and clinical consequences are evident: only the vocabulary produced when using both languages can be considered as an appropriate estimate of the individual's lexical knowledge. The advantage of using the either-language scoring system over other methods in Spanish–English bilinguals has been previously reported (Gollan et al., 2007; Kohnert et al., 1998).

The finding that the bilinguals of this study were able to produce more correct cognates than non-cognates illustrates a cognate facilitation effect in a standardized naming test. This facilitation effect can have clinical implications in the neuropsychological assessment of bilinguals' naming skills. In the case of Spanish–English bilinguals the use of both languages seems to represent an advantage in terms of the BNT performance. However, as reported by Gollan et al. (2007), bilinguals who speak languages with few cognates may obtain scores which may be wrongly interpreted as indicating a deficit. Therefore, understanding cognates seems to be essential for obtaining adequate BNT norms for bilingual populations. Also, it has been demonstrated that cognates have implications in the rehabilitation of bilingual aphasia. For example, after focal brain damage, bilingual aphasic patients are able to name pictures with cognates more accurately than pictures with non-cognate names (Roberts & Deslauriers, 1999); furthermore, recent treatment for the recovery of aphasia based on cognates has proven more successful than a treatment not based on cognates,

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as described by Kohnert (2004). The author reported that after treatment in one language only the names of cognates in one language generalize to the cognates in the other language.

There is an interesting observation that should be emphasized: even in the well-balanced bilinguals, naming ability was not equivalent in both languages. When using the "either language" scoring system, naming score was on average 53.80; while selecting the "both languages" scoring system yielded an average score of 44.72 (Table 3); that is, about seven points lower; suggesting that even in this balanced bilingual group, about 15% of the vocabulary corresponded to "unique words" (words known in only one language) and only about 85% to "translation equivalents" (words known in both languages).

Certain limitations of the current study include the use of only one naming test, the inclusion of only Spanish–English bilinguals, limited age and educational ranges, and differences in word frequency in both languages which may generate differences in the level of difficulty of the Spanish and English versions of the BNT. Despite these limitations, current results may contribute to the understanding of the language representation in bilinguals, not only for the purpose of interpretation of neuropsychological data but also for understanding educational issues in bilingual populations. Particularly noteworthy is the finding that even balanced bilinguals name some words in only one language, which is also found in children on expressive and receptive tasks, although effects for young children seem more variable (Kelley & Kohnert, 2012; Méndez-Pérez et al., 2010).

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Author biographies

Mónica Rosselli is a professor of neuropsychology at the Department of Psychology, Florida Atlantic University, in Boca Raton, Florida, USA. Her research interests include neuropsychology of aging and bilingualism, and the influence of education and culture in neuropsychological assessment.

Alfredo Ardila is a professor at the Department of Communication Sciences and Disorders, Florida International University, in Miami, Florida, USA. His scholarly interests include aphasia, bilingualism, and origins of human cognition.

María Beatriz Jurado is a doctoral student at Florida Atlantic University, in Boca Raton, Florida, USA. Her research interests include the neuropsychology of healthy aging and dementia, bilingualism and the contribution of executive skills to daily living activities.

Judy Lee Salvatierra is an Associate Professor of psychology at the Department of Social Sciences, Miami Dade College, in Miami, Florida, USA. Her research interests include neuropsychology of bilingualism, aging, and Alzheimer's disease.

Appendix

Cognates and non-cognates used matched by level of difficulty

Cognates			Non-Cognates[a]		
Item #	English	Spanish	Item #	English	Spanish
30	harmonica	armónica	28	wreath	corona/guirnalda
31	rhinoceros	rinoceronte	29	beaver	castor
33	igloo	iglú	32	acorn	bellota/nuez
35	dominoes	dominó	34	stilts	zancos
39	hammock	hamaca	40	knocker	aldaba
43	pyramid	pirámide	44	muzzle	bozal
45	unicorn	unicornio	46	funnel	embudo
50	compass	compás	51	latch	pestillo
52	tripod	trípode	53	scroll	pergamino
55	sphinx	esfinge	54	tongs	tenazas/pinzas
58	palette	paleta	56	yoke	yugo
60	abacus	ábaco	59	protractor	transportador

[a] Note that non-cognates are more likely to be translated in more than one way than cognates (see Gollan et al., 2007; Tokowicz, Kroll, de Groot, & van Hell, 2002). Credit was given for producing any of the names listed correctly.

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