Introduction

The U.S. has the fifth largest Spanish-speaking community in the world, with 30 million citizens (12% of the population) that speak Spanish. The Hispanic elderly population is expected to increase from < 4 percent of the total elderly population in 1990 to 16 percent by the middle of the next century (U.S. Census Bureau, 2000). Hispanics are 30% more likely than non-Hispanic Caucasians to have a stroke, and thus are at a greater risk for aphasia.

Lexical retrieval impairments are the most common deficit in aphasia (Goodglass, 1980). As a result, a fundamental aspect of aphasia evaluations is testing naming abilities. However, there are no naming tests normed specifically for Spanish-English populations in the United States, and developing specific bilingual tests would be a multi-year process. Providing normative data on available naming tests is an alternative until appropriate tests can be developed.

Previous researchers have reported normative data on the *Boston Naming Test* (e.g., Kohnert, K.J., Hernandez, A.E., & Bates, E.,1998; Roberts, P.M., Garcia, L.J., Desrochers, A., & Hernandez, D., 2002), a common naming test for noun naming. Since selective grammatical impairments can exist in lexical retrieval (Druks, 2002), it is important to test verb and noun naming. There have been some reports of action naming in U.S. bilinguals (e.g., Jia, G., Kohnert, K., Collado, J., & Garcia, F.A., 2006), but the stimuli are not readily available. The *Object and Action Naming Battery* (O&A Naming Battery: Druks & Masterson, 2000) is a readily available test which provides a wide array of imageable nouns and verbs. At present there are no Spanish-English bilingual normative data available for this test, although there are some normative data on some of its action pictures in monolingual Spanish speakers in Spain (Cuetos, F., & Alija, M. (2003). Thus, the long term purpose of this study is to evaluate naming accuracy within a Spanish-English population on the *O&A Naming Battery*. The purpose of the current study is to evaluate preliminary data to 1) determine proficiency groups based on accuracy in naming, 2) evaluate whether language use and self rating scores generally describe the proficiency groups, and 3) determine if language use and self ratings correlate with naming accuracy in both languages.

Method

Participants. Fifty-five Spanish-English bilingual adults (age M=21 years) recruited from central and south Florida have participated thus far. Forty have been analyzed and are described here (the balance plus additional tested in the meantime will be analyzed by the time of the conference). Average age of acquisition was 5.35 years (SD=4.5) for English and 0.87 (SD=3.3) for Spanish. Participants were primarily educated in English (M = 13.16 (2.9) years; Spanish education M = 6.33 (4.3) years). All were self-defined as "functional" in both languages in most situations. Participants completed a language questionnaire (adapted from Muñoz, Copeland, and Marquardt, 1999) responding to questions regarding language background, language use and self ratings of language abilities. The majority of the participants were born in the United States (55%), with the balance of participants representing 9 other countries. Participants reported their Spanish was influenced by 14 different countries, with the highest percentage influenced by Cuba (23%).

Naming stimuli and procedure. All 162 noun pictures and 100 verb pictures from the *O&A Naming Test* were presented on a 17" computer monitor. Each picture was presented for 5 seconds, but the participant had as long as desired to name the picture before self-advancing the pictures.

Scoring and reliability. All responses appropriate to the picture were accepted, including dialectal or lexical variations. Scoring was conducted by trained bilingual Communication Sciences and Disorders students. Accuracy reliability for 50% of the responses was conducted by the same students (i.e., those scoring English performed reliability on Spanish and vice versa). Reliability was 99% for English and 95% for Spanish.

Results

Overall Naming accuracies. A Oneway ANOVA revealed a significant effect for naming accuracy for language ($F(2, 117) = 84.997$, $p = .000$). (English accuracy = 94.76 (3.75), Spanish = 73.74 (14.26), and Composite accuracy (total number correct irrespective of language) = 96.22 (2.45). Tukey post-hoc analyses revealed a significant difference in accuracy for English and Spanish and Spanish and Composite (for both, $p = .000$) with no difference between English and Composite ($p = .728$).

No difference was observed in naming across grammatical class where noun accuracy across languages was 86.32 (13.54), and verb accuracy was 82.18 (16.41) ($F (1, 159) = 3.032$, $p = .084$).

Grouping of participants and overall accuracy. Participants were assigned to one of three proficiency groups: English proficient (N=32), Balanced bilingual (N=7), and Spanish proficient (N=1). Participants whose difference in naming across languages was < 8.6 were put into the balanced group. Those with a difference > 8.6 were put into a proficient group (e.g., English group if English accuracy was > 8.6 than Spanish accuracy). The cut-off number (8.6) was determined by the following equation: mean difference in naming across languages (22.48) - standard deviation of that mean difference (13.89) = 8.59 (see Kohnert et al., 1998).

Please see Table 1 for naming accuracy, language use, self rating, and demographic averages for all 3 groups. Overall, the averages reflect higher accuracy, use, and self ratings for the more proficient language in the proficient groups and more balanced results for the bilingual group. Statistics were not run within groups due to the small and inconsistent number of participants across groups.

Correlations. Correlations between language use (percent time using English, Spanish, bilingual context), self ratings (speaking, comprehension, reading and writing for each language), and age of acquisition for each language were examined with respect to overall English and Spanish naming accuracy.

For English accuracy, Pearson correlations >.500 with a significance at the .01 level were 1) Percent time using English (.512) and Spanish (.525), 2) self ratings of informal speaking and comprehension ability in English (.828 and .775, respectively), years of English education (.647), and age of acquisition of English (-.589).

For Spanish accuracy, Pearson correlations >.500 with a significance at the .01 level were 1) self ratings of formal speaking, informal speaking, informal comprehension, and writing abilities in Spanish (.644, .659, .547, and .529, respectively) and age of acquisition of English (.601). See Table 2 for details.

Discussion

These preliminary results reveal that the *Object and Action Naming Battery* may be appropriate for Spanish-English bilingual adult populations in the United States given the high composite scores across participants ($M = 96.22$, SD = 2.45).

The current accuracy patterns are similar to previous reports for U.S. Spanish-English bilingual populations, in that participants are primarily English dominant or Balanced (e.g., Kohnert et al., 1998). Overall, nouns were named more accurately than verbs, a common finding

in the naming literature. However, factors affecting naming such as length, imageability and cultural appropriateness of items were not controlled but will be considered in future post-hoc analyses.

Preliminary findings reveal that self rating scores are the best predictor for naming performance across languages, a finding reported regularly in the relevant literature (e.g., Delgado, Guerrero, Goggin, & Ellis, 1999; Marian, Blumenfeld, & Kaushanskaya, 2007). Also consistent with this literature, age of acquisition was not positively correlated with naming accuracy since the majority of participants learned Spanish first at home but later became more proficient in English with English education.

Overall, these findings are extremely preliminary and more participants are needed. However, the results are a first step in providing normative data for the *Object and Action Naming Battery* to clinicians and researchers interested in serving and studying Spanish/English bilingual populations in the U.S.

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Table 1

Accuracy and self ratings of language abilities, and age of acquisition for all three proficiency groups

Factor	English Proficient Group	Balanced Group	Spanish Proficient Group
Accuracy (%) (SD)			
Overall English accuracy	95.65 (2.19)	92.66 (5.02)	80.9
English nouns	96.12 (2.5)	93.7 (4.5)	85.8
English verbs	95.19 (2.78)	91.57 (5.7)	76.0
Overall Spanish accuracy	68.94 (11.6)	92.3 (2.78)	97.5
Spanish nouns	73.06 (12.18)	93.3 (2.27)	96.9
Spanish verbs	64.82 (11.7)	91.29 (3.33)	98.0
Language usage			
English % **use**	77 (13.4)	61 (12)	15
Spanish % **use**	23 (12.7)	39 (12)	85
English ratings (1-7)			
Formal speaking	6.94 (.26)	6.29 (.95)	6
Informal speaking	7 (0)	6.57 (.79)	5
Formal comprehension	6.22 (.91)	6.29 (.95)	6
Informal comprehension	6.53 (.67)	6.86 (.38)	6
Reading	6.97 (.17)	6.43 (.79)	6
Writing	6.97 (1.7)	6.29 (.76)	6
Spanish ratings (1-7)			
Formal speaking	4.94 (1.36)	6.43 (.79)	7
Informal speaking	5.87 (1.04)	6.86 (.38)	7
Formal comprehension	6.22 (.91)	6.86 (.38)	7
Informal comprehension	6.53 (.67)	7 (0)	7
Reading	5.65 (1.07)	6.57 (1.13)	7
Writing	5.03 (1.35)	6.57 (1.13)	7
Demographics			
Age of acquisition – English	3.97 (2.2)	10.3 (7.23)	14
Age of acquisition - Spanish	.61 (2.6)	2.14 (5.67)	0

Table 2

Correlations between self-ratings, language use, and demographic data and naming accuracy in English and Spanish

Factor	English accuracy	Spanish accuracy
Percent time using language		
English % **use**	**.512****	-.487**
Spanish % **use**	**.525****	.484**
English ratings (1-7 scale)		
Formal speaking	.387*	-.370*
Informal speaking	**.828****	-.368*
Formal comprehension	.473**	-.406*
Informal comprehension	**.775****	-.314*
Reading	.339*	-.350*
Writing	.621*	-.448**
Spanish ratings (1-7 scale)		
Formal speaking	-.225	**.644****
Informal speaking	-.180	**.659****
Formal comprehension	-.327*	.488**
Informal comprehension	-.327*	**.547****
Reading	-.252	.477**
Writing	-.290	**.529****
Age of acquisition – English	**-.589****	**.601****
Age of acquisition - Spanish	.243	-.061
Years education – English	**.647****	-.418**
Years education - Spanish	-.351*	.172

**Pearson correlation is significant at the .01 level (2-tailed)
**Pearson correlation is significant at the .05 level (2-tailed)