

Confrontation naming and semantic relatedness judgments in Spanish/English bilinguals

Lisa A. Edmonds, MA, CCC-SLP & Swathi Kiran, Ph.D., CCC-SLP
Aphasia Research Laboratory,
Department of Communication Sciences and
Disorders
University of Texas at Austin

Abstract

Twenty-three Spanish/English bilinguals were given a confrontation naming task and a semantic relatedness questionnaire in both languages. The same set of stimuli, controlled for various factors, was used for each task in both languages. Based on their naming performances, subjects were divided into one of three groups: balanced bilingual (N=10), English dominant (N=10), and Spanish dominant (N=3). Dominance was calculated by comparing the difference between naming performance in both languages against the mean difference (6.18) in naming for all of the subjects (Kohnert, Hernandez, & Bates, 1998). Subjects more than one standard deviation from the mean were deemed dominant in the language with the higher naming score. On the semantic relatedness task, subjects revealed no significant difference between the ratings of word pairs in each language across subjects or across items in any group. These findings support the mixed model of semantic representation and lexical access in bilinguals with differing language abilities.

Introduction-1

- Numerous models have been proposed to explain semantic representation and access of lexical items between the two languages (L1 and L2) in bilingual adults.
- The **word association model** suggests that L2 gains access to concepts only through L1 mediation (Potter, So, Von Eckhardt, & Feldman, 1984).
- The **concept mediation model** suggests that L2 directly accesses concepts without L1 mediation (Potter, So, Von Eckhardt, & Feldman, 1984).
- The **asymmetrical model** suggests that L1 is represented larger than L2, and the links between words and concepts are stronger for L1 than L2 (Kroll & Stewart, 1990; 1994).
- Finally, the **mixed model** proposes that lexical connections in both languages are connected directly and indirectly via a shared representation in conceptual memory (De Groot et al, 1992).

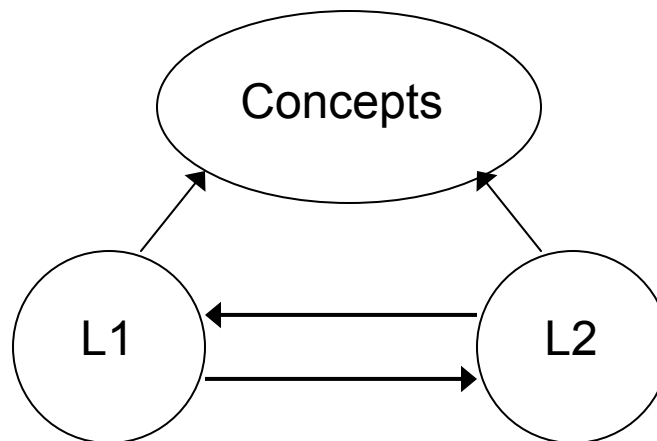
Introduction-2

- Empirical evidence that the two languages of a bilingual access a common semantic network (Francis, 1999) comes from semantic priming (Chen & Ng, 1989; Schwanenflugel & Rey, 1986; Keatley, Spinks, & De Gelder, 1994), **CROSS language categorization** (Caramazza & Brones, 1980, Potter et al, 1984), **picture word interference** (Hermans, Bongarts De Bot, & Schruder, 1998), and **neuroimaging studies** (e.g., Chee, Tan, & Thiel, 1999; Illes et al., 1999; Klein, Milner, Zatorre, Meyer, & Evans, 1995; Perani et al., 1996).
- Semantic comparisons between words of different languages have been shown to take no longer than comparisons between words in the same language, suggesting integration of semantic information between languages (Dufour & Kroll, 1995; Potter et al., 1984).
- Most of the aforementioned studies have focused on lexical semantic representation and processing.
- A few studies that have investigated naming proficiency in balanced bilingual adults have found that performance on Spanish naming is poorer than English naming (Kohnert, Hernandez, & Bates, 1998; Roberts, Desrochers, Hernandez, 2002).

The present experiment

- The **present study** was aimed at investigating the **relationship** between **oral confrontation naming** and **semantic representation** in bilingual adults by using the same set of stimuli for both tasks.
- It was **predicted** that normal bilingual individuals would demonstrate **equal levels of performance** on the semantic relatedness task and naming accuracy tasks, thus **supporting the mixed model of bilingual lexical representation** (de Groot, 1992).

Mixed Model



Participant Information

Groups	Number of Females	Number of Males	Average Age/SD	Average Years of Education/SD	Average Age Learned English/SD	Average Age Learned Spanish/SD
Balanced (N=10)	9	1	41.5 12.7	16.1 2.24	3.65 2.24	1.0 1.58
English Dominant (N=10)	9	1	30.2 16.0	15.2 4.28	2.45 4.28	.50 2.11
Spanish Dominant (N=3)	1	2	33.0 3.46	16.0 2.0	4.67 4.16	2.0 3.46
Groups Combined	19	4	35.5 14.2	15.7 2.01	3.26 3.35	.652 1.68

Subjects were put into groups by comparing the difference between naming performance in both languages against the mean difference (6.18) in naming for all of the subjects (Kohnert, Hernandez, & Bates, 1998). Subjects more than one standard deviation from the mean were deemed dominant in the language with the higher naming score.

Materials and Methods

Stimuli.

Naming Task:

- 150 pictures were developed for the oral naming task.
- All words were between 1 and 4 syllables, with an average of 2.58 for Spanish and 1.53 for English.
- Only high to moderate frequency words were selected for use in each language (English = 5 or higher, Spanish = 3 or higher; Frances & Kucera, 1982; Juilland & Chang-Rodriguez, 1964 respectively).
- Cognates (e.g., *elephant* and *elefante*) or words with greater than 50% phonetic similarity (e.g., *cat* and *gato*) were eliminated.
- There were two sets of stimuli, one for each language, with a different order of presentation for each.

Materials and Methods

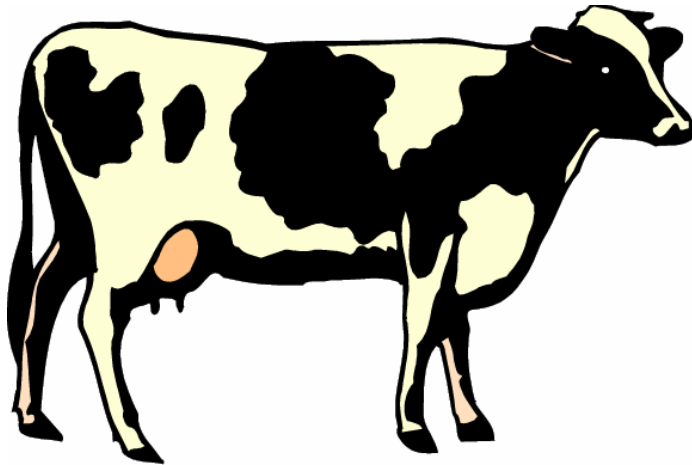
Stimuli.

Semantic Relatedness Task:

- 150 pairs of words were developed for this task.
- Each word used in the naming task was paired with another word from the same list.
- In order to create more semantic variation in pairs, some words were used more than once.
- Beneath each word pair, a 4-point rating scale where 1 indicated very similar and 4 indicated not similar was typed.

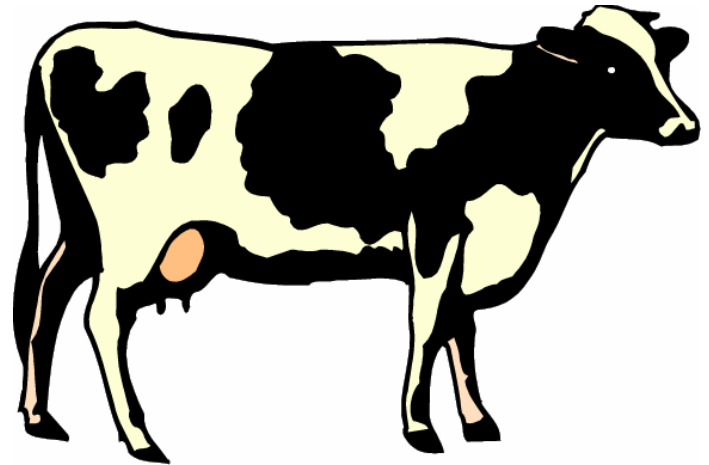
Examples of Naming Stimuli

English



Cow

Spanish



Vaca

Examples of Semantic Relatedness Task

English				Spanish			
	Horse – Cow				Caballo – Vaca		
1	2	3	4	1	2	3	4
Very similar			Not similar	Muy similar			No similar
	Orange – Apple				Naranja – Manzana		
1	2	3	4	1	2	3	4
Very similar			Not similar	Muy similar			No similar
	Star – Sun				Estrella – Sol		
1	2	3	4	1	2	3	4
Very similar			Not similar	Muy similar			No similar
	Fork – Spoon				Tenedor – Cuchara		
1	2	3	4	1	2	3	4
Very similar			Not similar	Muy similar			No similar

Procedures and Scoring

Naming Task. Participants participated in two sessions, with at least one day separating them. Each session lasted approximately 30 minutes. One half of the participants named in Spanish in the first session, the other half named in English in the first session.

Scoring. Words were considered incorrectly named if they could not be found in an English, Spanish, or bilingual dictionary, or, to consider local norms, if less than 10% of the subjects did not use the word in question.

E.g., “avispa” (“wasp”) was considered correct for “abeja” (“bee”) because more than 10% of the subjects used this term, and they named it “bee” in English.

Procedures and Scoring

Semantic Relatedness Task.

After naming the pictures, each participant completed a semantic relatedness questionnaire.

Subjects were instructed to rate the word pairs on how similar/related they thought the words were in meaning.

If they did not recognize a word, they were asked to cross the word pair out and not rate it.

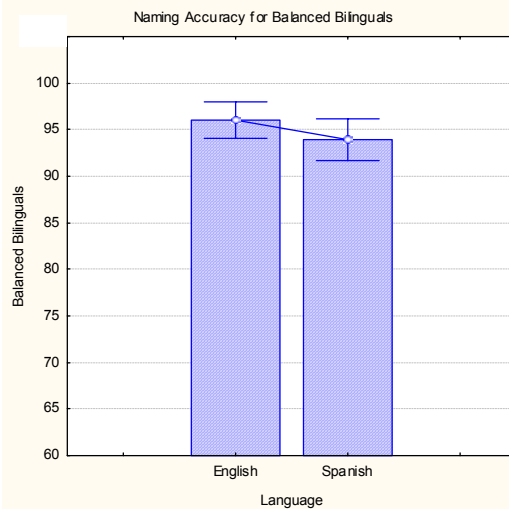
Naming Accuracy and Subject Self-Rating of Conversational Skills Across Groups

Group	English naming Average/SD	Spanish Naming Average/SD	Difference in Naming Accuracy Between Language Average/SD	Speaking English Informal Self-rating (1-7) Average/SD	Speaking Spanish Informal Self-rating (1-7) Average/SD	Listening English Informal Self-rating (1-7) Average/SD	Listening Spanish Informal Self-rating (1-7) Average/SD
Balanced Bilinguals (N=10)	96.07 2.70	93.9 3.19	2.11 .50	6.9 .32	6.8 .42	6.9 .32	7 0
English Dominant (N=10)	96.6 1.81	80.7 8.83	16.22 7.02	6.9 .32	6.2 .63	7 0	6.6 .52
Spanish Dominant (N=3)	80.4 3.89	94.2 3.16	13.73 .74	5.67 1.15	7 0	6 1	7 0
Overall (N=23)	94.37 6.18	88.20 9.07	6.18* 8.84	6.65 .71	6.56 .60	6.74 .62	6.83 .39

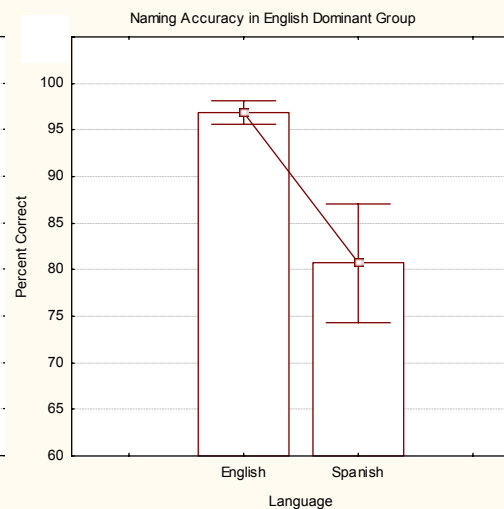
*This average was used to determine dominance for each subject. If the difference between a subject's naming performance across languages was more than 6.18, he/she was considered dominant in the language with the higher score.

Naming Accuracy for All Groups Across Subjects

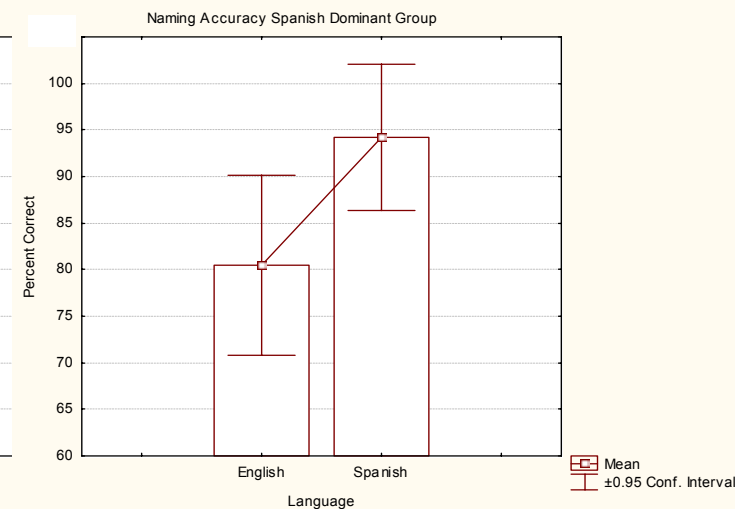
Balanced Bilinguals



English Dominant



Spanish Dominant



$F(1,18) = 2.54818277, p = 0.1278$

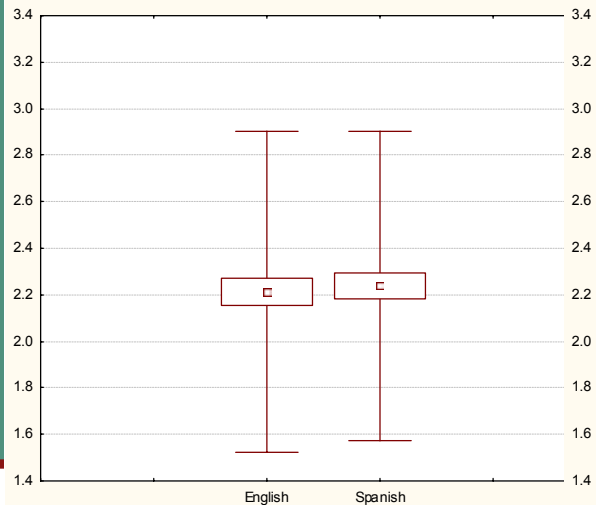
$F(1,18) = 32.3717882, p = 0.00002$

$F(1,4) = 22.5184399, p = 0.0090$

No significant difference seen in the Balanced group. There is a significant difference in naming abilities in the English dominant and Spanish dominant groups.

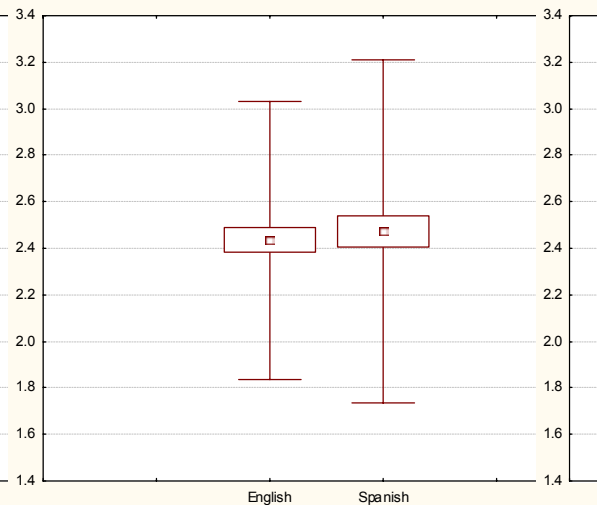
Semantic Relatedness Judgments for All Groups Across Items

Balanced Bilinguals



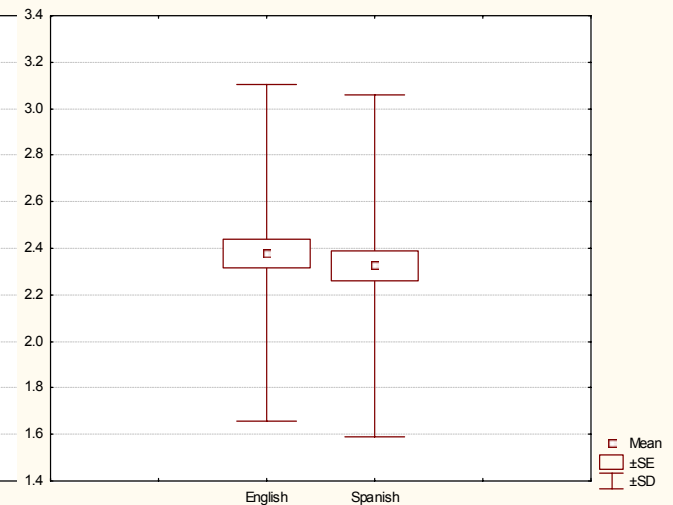
$t(138)=.77, p=.44$

English Dominant



$t(123)=.65, p=.51$

Spanish Dominant



$t(136)=.85, p=.39$

No significant difference in semantic ratings is seen within any group. This indicates that subjects in all groups may have shared semantic representation despite their differing language proficiencies.

Additional Results

Naming accuracy across items was significantly different for the English dominant ($t(149)=8.13$, $p<.05$) and Spanish dominant group ($t(149)=-5.64$, $p<.05$). These results are consistent with the naming across subjects results.

There was also a significant difference for the Balanced group ($t(149)=2.59$, $p<.05$). This is inconsistent with the across subjects results and appears to be due to a few words consistently missed in Spanish.

Semantic relatedness judgments for all groups **across subjects** showed *no significant difference* in any group.

- Balanced Group: $t(9)=-.48$, $p=.64$
- English Dominant Group: $t(9)=-.39$, $p=.71$
- Spanish Dominant Group: $t(2)=1.57$, $p=.26$

These results are consistent with the findings of no significant difference in semantic relatedness judgments across items.

Discussion

Naming

Bilingual adults have differing naming abilities that may reflect a balance in their language abilities or a language dominance (Spanish or English in these subjects).

The balanced group showed no significant difference in naming across subjects in both languages while there was a significant difference in naming between languages in the Spanish and English dominant groups.

Semantic Relatedness Judgments

Regardless of language abilities, all three groups (balanced, English dominant, Spanish dominant) showed no significant difference across subjects and items in rating word pairs in terms of semantic relatedness.

Conclusion

- These findings indicate that despite differential access for naming (**L1 and L2**) across languages, semantic representation (concepts) is the same in English and Spanish for bilinguals.
- These results support the **Mixed Model** of semantic representation and lexical access in bilinguals (De Groot et al, 1992) which proposes that lexical connections in both languages are connected directly and indirectly via a shared representation in conceptual memory.
- It is important to understand the semantic representation and lexical organization of bilinguals in order to evaluate and treat language disorders appropriately in this population.

References

- Caramazza, A. & Brones, I. (1980). Semantic classification by bilinguals. *Canadian Journal of Psychology*, *34*, 77-81.
- Chee, M. W. L., Tan, E. W. L., Thiel. (1999). Mandarin and English single word processing studied with functional magnetic resonance imaging. *The Journal of Neuroscience*, *19*, 3050-3056.
- Chen, H. C. & Ng, M. L. (1989). Semantic facilitation and translation priming effects in Chinese-English bilinguals. *Memory and Cognition*, *17*, 454-462.
- De Groot, A. M. B. (1992). Determinants of word translation. *Journal of Experimental Psychology: Learning, Memory and Cognition*, *18*, 1001-1018.
- Dufour, R. & Kroll, J. (1995). Matching words to concepts in two languages: A test of the concept mediation model of bilingual representation. *Memory and Cognition*, *23*(2), 166-180.
- Frances, N. & Kucera, J. (1982). *Frequency analysis of English usage*. Boston: Houghton Mifflin & Company.
- Francis, W. S. (1999). Cognitive integration of language and memory in bilinguals: semantic representation. *Psychological Bulletin*, *125*, 193-222.
- Herman, D., Bongarts, T., De Bot, K., & Schreuder, R. (1998). Producing words in a foreign language: Can speakers prevent interference from their first language? *Bilingualism: Language and Cognition*, *1*, 213-229.
- Illes, J., Francis, W. S., et al. (1999). Convergent cortical representation of semantic processing in bilinguals. *Brain and Language*, *70*(3), 347-63.
- Juilland, A. & Chang-Rodriguez (1964). *Frequency dictionary of Spanish words*. London: Mouton & Co.
- Keatley, C. W., Spinks, J. A., et al. (1994). Asymmetrical cross-language priming effects. *Memory and Cognition*, *22*, 70-84.
- Klein, D., Milner B., et al. (1995). The neural substrates underlying word generation: A bilingual function-imaging study. *Proceedings of the National Academy of Sciences USA*, *92*, 2899-2903.
- Kohnert, K. J., Hernandez A. E., et al. (1998). Bilingual performance on the Boston naming test: preliminary norms in Spanish and English. *Brain and Language*, *65*(3), 422-40.
- Kroll, J. F. & Stewart, E. (1990). *Concept mediation in bilingual translation*. 31st Annual Meeting of the Psychonomic Society, New Orleans.
- Kroll, J. F. & Stewart, E. (1994). Category interference in translation and picture naming: Evidence for asymmetric connections between bilingual memory representations. *Journal of Memory and Language*, *33*, 149-174.
- Munoz, M., Marquardt, T. et al. (1999). A comparison of the codeswitching patterns of aphasic and neurologically normal bilingual speakers of English and Spanish. *Brain and Language*, *66*, 249-274.
- Perani, D., Dehaene, S. et al. (1996). Brain processing of native and foreign languages. *NeuroReport*, *7*, 2439-2444.
- Potter, M., So, K. et al. (1984). Lexical and conceptual representation in beginning and proficient bilinguals. *Journal of Verbal Learning and Verbal Behavior*, *23*, 23-381.
- Roberts, P. M., Garcia, L.J. et al. (2002). English performance of proficient bilingual adults on the Boston Naming Test. *Aphasiology*, *16*(4-6), 635-645.
- Schwanenflugel, P. J. & Rey, M. (1986). The relationship between category typicality and concept familiarity: evidence from Spanish- and English-speaking monolinguals. *Memory and Cognition*, *14*(2), 150-63.