# A theoretical account of lexical and semantic deficits in bilingual aphasia

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## INTRODUCTION

- The corpus of bilingual aphasia literature is limited to single subject designs.
  - Multiple subjects designs are more useful because they enable researchers to discuss results that apply to a group of subjects rather than just an individual.
- Current bilingual aphasia research does not apply theoretical frameworks to explain language processing impairments (Detry, Pillon, & de Partz, 2005; Edmonds & Kiran, 2006).
  - With the use of models we can begin to understand how the individual factors of pre-morbid language proficiency relate to lexico-semantic impairment and recovery in bilingual aphasia.
- This genre of literature does not incorporate language-use history information when analyzing the language deficit data.
  - The omission of comprehensive pre-stroke language histories does not allow for in-depth analysis of post-injury language impairment (Munoz & Marquardt, 2003).

## OBJECTIVES

- **Examine the degree of lexical and semantic processing impairment at different levels within language processing.**

**Specific Aims**

1. **What is the nature of language impairment based on standard language assessments?**
   - We examined the nature of language impairment and attempted to incorporate the results into a theoretical framework of bilingual language processing.
2. **How does pre-morbid language proficiency in each language influence post-stroke lexical and semantic deficits in each language?**
   - We predict that self-rating can be used to determine post-stroke language presentation profiles.
3. **Are there distinct subgroups by which we can categorize these patients?**
   - We predict that we will find patterns between pre-stroke proficiency and post-stroke language impairment.

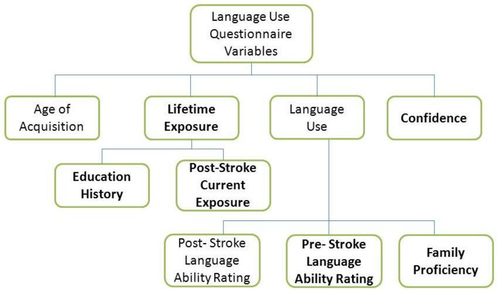
## PARTICIPANTS

19 Spanish-English aphasic patients recruited from Austin, TX and Boston, MA.

- All patients were speakers of Spanish and English before stroke.
- Education levels ranged from elementary school to college level.
  - 11 females, age range 33-85.6 years (average = 63.1, SD = 17.82)
  - 8 males, age range 37-75.2 years (average = 54.4, SD = 14.26)

## METHODS

Language Use Questionnaire:




* Bolded variables selected for subsequent analysis.

Language Tests: Bilingual Aphasia Test (BAT), Boston Naming Test (BNT), Pyramids and Palm Trees Test-Picture Version (PAPT)

Organization of Data Variables:

*PAPT Non-linguistics*: Pyramids and Palm Trees Test-Picture Version

*BAT English Semantics/Spanish Semantics*: average of BAT subtests semantic categories, synonyms, antonyms I & II, semantic acceptability, and semantic opposites

*BAT English Comprehension/Spanish Comprehension*: average of BAT subtests pointing, semi-complex commands and complex commands

*Word Recognition (Spanish into English and vice versa)*: BAT subtest

*Translation (Spanish into English and vice versa)*: average of BAT subtests word translation and sentence translation

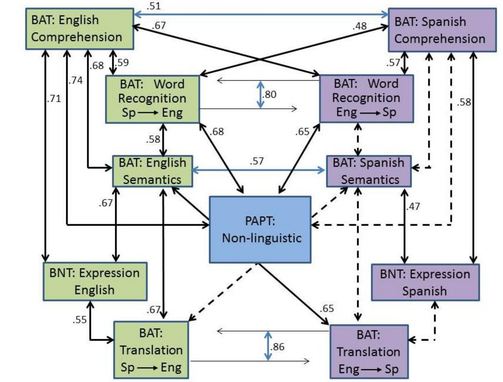
*BNT English Expression/Spanish Expression*: Boston Naming Test

## RESULTS

**Question 1: What is the nature of language impairment based on standard language assessments?**

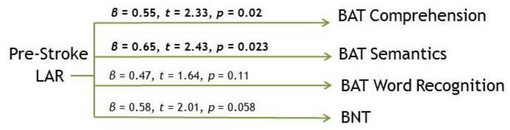
- A Pearson pairwise correlation was performed to identify significant connections between diagnostic scores which represent specific levels of our framework of language processing in bilingual aphasia.

Framework of Bilingual Language Processing. All p-values < 0.05.




- All correlations are bidirectional; blue lines represent corresponding levels of the framework.
- BAT English Semantics acts like an anchor that drives translation skills; the expressive language system places more reliance on Semantics English compared to Semantics Spanish.
- Asymmetrical Aspects: English side has more significant correlations compared to Spanish; all of which are stronger. (Dotted lines represent non-significant but theoretically valid correlations).

**Question2: How does pre-morbid language proficiency in each language influence post-stroke lexical semantic deficits in each language?**

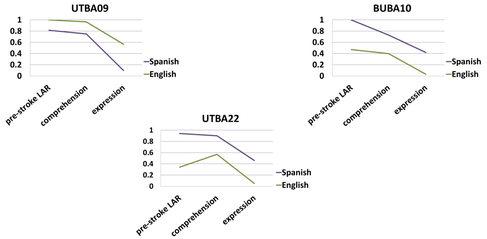



- 3 LUQ predictors (confidence, pre-stroke LAR, and post-stroke current exposures) used as regressors; only pre-stroke LAR was significant.

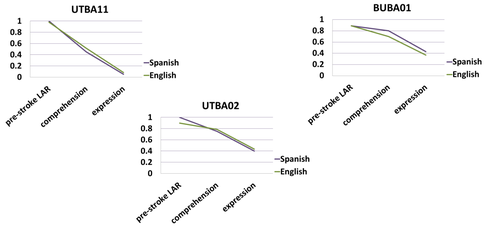
## RESULTS

**Question 3: Are there distinct subgroups by which we can categorize these patients?**

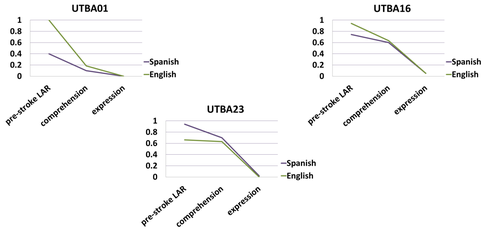
Subgroup 1: Differential pre-stroke LAR followed by similar trending post-morbid language impairment. Equal language loss in both languages. (*N* = 5)




Subgroup 2: Equivalent pre-stroke LAR followed by similar levels of post-morbid language impairment. Equal language loss in both languages. (*N* = 4)




Subgroup 3: Differential pre-stroke LAR followed by similar levels of post-morbid language impairment. More language loss in one language compared to the other. (*N* = 8)




## CONCLUSIONS

1. We have developed a theoretical framework of bilingual language processing based on language deficits from 19 Spanish-English aphasic patients.
   - This framework reveals that the expressive language system uses the level of BAT English Semantics as an anchor to complete linguistic tasks such as translation.
2. Our findings indicate that pre-stroke LAR is a predictor of post-stroke performance on BAT Comprehension and BAT Semantics.
3. We identify patterns of language impairment across languages within a bilingual brain which will aid clinicians in the diagnosis and targeting of on-going language treatment programs.

A) Differential pre-stroke LAR, equal language loss
B) Equivalent pre-stroke LAR, equal language loss
C) Differential pre-stroke LAR, unequal language loss

### Indications

- Impairment trends are independent from a patient's pre-morbid dominant language or first language status.
- Our findings based on Spanish-English bilingual aphasics can be extended to bilingual populations with other language combinations.

## SELECTED REFERENCES

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