Bilingual Aphasia: What is the role of proficiency and impairment?

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Project Goals

1. Determine patterns of lexical and semantic processing deficits in bilingual aphasia and conceptualize a theoretical framework that accounts for language deficits;
2. Identify language proficiency measures that predict post-stroke language deficits.
Bilingual Language Processing: receptive language

Bilingual Interactive Activation Model + (Dijkstra & van Heuven, 2002)
Bilingual Language Processing: expressive language

Revised Hierarchical Model
(Kroll & Stewart, 1994)
Monolingual Language Processing

(Ellis and Young, 1988)
(Annotated version)
Expression
Spanish

Comprehension
English

Word Recognition
Sp → Eng

Expression
English

Comprehension
Spanish

Word Recognition
Eng → Sp

Semantics
English

Semantics Non-linguistic

Semantics
Spanish

Translation
Sp → Eng

Translation
Eng → Sp

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19 Spanish-English bilingual aphasic patients (mean age 63.1, SD 17.82); 11 females

- **Bilingual Aphasia Test (BAT):** English and Spanish + Part C
- **Boston Naming Test (BNT):** English and Spanish
- **Pyramids and Palm Trees (PPT):** Picture Version
- **Language Use Questionnaire (Kiran, Pena, Bedore, & Sheng, 2010)**
Language Use Questionnaire Variables

- Lifetime Exposure
- Family Proficiency
- Age of Acquisition
- Education History
- Confidence
- Pre-Stroke Language Ability Rating
- Post-Stroke Language Ability Rating
- Post-Stroke Current Exposure
Theoretical framework that accounts for language deficits

Conceptualize a framework for bilingual language processing

- Foundation based on psycholinguistic models
- Connections validated with patient data
Semantics Non-Linguistics: PPT-Picture Version


Comprehension English/Spanish: average of 3 BAT subtests: Pointing, Semi-Complex Commands, and Complex Commands

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

Expression English/Spanish: BNT

Translation (Spanish into English and vice versa): average of 2 BAT Part C subtests, Word and Sentence Translation

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Figure 1: Schematic of Bilingual Language Processing. All p-values < 0.05.

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Figure 1: Schematic of Bilingual Language Processing. All p-values < 0.05.

Comprehension English

Expression Spanish

Word Recognition

Semantics

Translation

Semantics Non-linguistic

Expression English

Translation Sp → Eng

Word Recognition Eng → Sp

Semantics English

Comprehension Spanish

Semantics Spanish

Translation Eng → Sp

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Identify language proficiency measures that predict post-stroke language deficits

1. Determine language metrics

2. Decide LUQ metrics
Organization of Data Variables

- **Comprehension English/Spanish**
  Average of 3 BAT subtests: Pointing, Semi-Complex Commands, and Complex Commands

- **Semantics English/Spanish**
  Average of 6 BAT subtests: Semantic Categories, Synonyms, Antonyms I & II, Semantic Acceptability, and Semantic Opposites

- **Expression English/Spanish**
  BNT

- **Word Recognition (Spanish into English and vice versa)**
  BAT Part C subtest Word Recognition
Dependent Measures:
BAT Comprehension, BAT Semantics, BNT and BAT-Word Recognition
(Categorical Variable: Language)
Identify language proficiency measures that predict post-stroke language deficits

- Confidence
- Current Exposure
- Pre-Stroke LAR

- BAT Comprehension
  $(R^2 = .499, F(3, 22) = 7.33, p \leq 0.01)$

- BAT Semantics
  $(R^2 = .33, F(3, 21) = 3.57, p \leq 0.05)$

- BNT
  $(R^2 = .25, F(3, 22) = 2.52, p = 0.08)$

- BAT Word Recognition
Identify language proficiency measures that predict post-stroke language deficits

Pre-Stroke LAR

- $B = 0.55, t = 2.33, p = 0.02$ → BAT Comprehension
- $B = 0.65, t = 2.43, p = 0.023$ → BAT Semantics
- $B = 0.58, t = 2.01, p = 0.058$ → BNT
- $B = 0.47, t = 1.64, p = 0.11$ → BAT Word Recognition
1. The benefit of using a framework to interpret patient data:
   - Where is language breaking down?

2. Our framework can be used with language combinations other than Spanish-English
   - Our framework is meant to explain a diverse set of test results.

3. The importance of pre- and post-morbid language use data to interpret bilingual aphasic data:
   - Language impairment vs pre-morbid proficiency
Figure 1: Schematic of Bilingual Language Processing. All p-values < 0.05.

Gray & Kiran (under revision)
Future Directions

1. Expand our sample size to include more patients.
2. Evaluate the data of other language combinations
3. Use pre-stroke LAR as a means to identify impairment patterns within our patients.
THANK YOU

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References


Results: Are there distinct subgroups into which patients with bilingual aphasia can be categorized?

Determine the relationship between language proficiency and post-stroke language deficits.

Pre-Stroke Language Proficiency:
- pre-stroke LAR

Post-Stroke Comprehension/single word naming:
- BAT Comprehension (average of subtests Pointing, Semi-Complex and Complex Commands)
- BNT

We established three subgroups of post-stroke language impairment presentations among our patients (N=17).
Results: Are there distinct subgroups into which patients with bilingual aphasia can be categorized? (N=17)

Group 1: Parallel (n=5).
Results: Are there distinct subgroups into which patients with bilingual aphasia can be categorized? (N=17)

Group 2: Parallel (n = 4).
Results: Are there distinct subgroups into which patients with bilingual aphasia can be categorized? (N=17)

Group 3: Differential (n=8)