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## Introduction

### What are pronominal words (pronouns)?

- Linguistic items used to refer to contextual information and rely on intact syntactic and semantic processing ability for successful interpretation
- Are crucial in functional expressive and receptive communication
- Do not naturally occur on their own without a contextual antecedent (i.e. a girl → she/her)

### Why pronouns?

- Demonstrable difficulty for people with aphasia (PWA)
- Knowledge gaps and asymmetry of investigation in the current literature re: pronoun comprehension in PWA
- Insufficient knowledge at word and discourse levels
- Inconsistent findings at sentence level using online and offline methodologies with both simple transitive sentences and complex sentences.

### In sentences:

PWA show inconsistent performance of pronoun comprehension during sentence processing (Varlokosta & Edwards, 2003)

#### Representational account

- Interpretation failure attributed to an underlying syntactic impairment in which PWA are unable to extract and resolve grammatical information (Edwards & Varlokosta, 2007; Love et al, 1998)

#### Processing account

- Interpretation failure attributed to extra-linguistic impairments e.g. general depressed aptitude for syntactic and/or semantic computations, delayed processing, restricted working memory, or lexical integration difficulties (Caplan et al, 2007; Choy & Thompson, 2005, 2010; Grodzinsky et al, 1993; Piñango & Burkhardt, 2001; Ruigendijk & Avrutin, 2003)

| Impaired pronouns<br>Impaired reflexives  | Impaired pronouns<br>Spared reflexives       | Spared pronouns<br>Impaired reflexives  | Spared pronouns<br>Spared reflexives |
|---|--|---|--------------------------------------|
| Love et al (1998)<br>Choy & Thompson (2005, 2010)<br>Thompson & Choy (2009)<br>Edwards and Varlokosta (2007)<br>Ruigendijk et al. (2006)<br>Ruigendijk and Avrutin (2003) | Grodzinsky et al (1993)<br>Love et al (1998) | Varlokosta and Edwards (2003)<br>Piñango and Burkhardt (2001)<br>Burkhardt et al. (2008)* | Ruigendijk et al. (2006)             |

### In discourse:

PWA demonstrate a select difficulty when processing discourse-linked information compared to processing non-discourse-linked information (Avrutin, 2000, 2006; Bos et al., 2014; Peristeri & Tsimpli, 2013; Pesetsky, 1987).

- Implicit discourse-linked pronoun processing:** pronouns and their contextual antecedent must be bound locally within the same sentential clause.
- Explicit discourse-linked pronoun processing:** pronouns are coindexed with a contextual referent, or set of referents, in a different location within the discourse matrix.

## Study Aim

**Aim:** To systematically investigate comprehension of personal pronouns (e.g. he, she, they, him, her, them ) and reflexives (i.e. themselves, himself, herself) in PWA to better understand under what conditions these difficulties arise.

## Methodology

### Participants:

Study group: 20 people with aphasia (13 fluent, 7 nonfluent) (12 males, 8 females; aged 50 to 80 years,  $\bar{x}$  =66.25)

Control group: 10 healthy adult speakers was used, and matched appropriately

### Methodology:

| Experiment | Measure                            | Task Paradigm  | Data analysis |
|------------|------------------------------------|--|---------------|
| 1          | Pronoun comprehension in sentences | Auditory sentence-picture matching task                        | GLMM          |
| 2          | Pronoun comprehension in discourse | Auditory comprehension task + <i>who</i> -comprehension probes | GLMM          |

### In sentences:

- 1-, 2-, 3-argument sentences with nouns and pronouns
- Sentence conditions tested: active, passive, nonreversible, reversible, reversible + pronoun competition

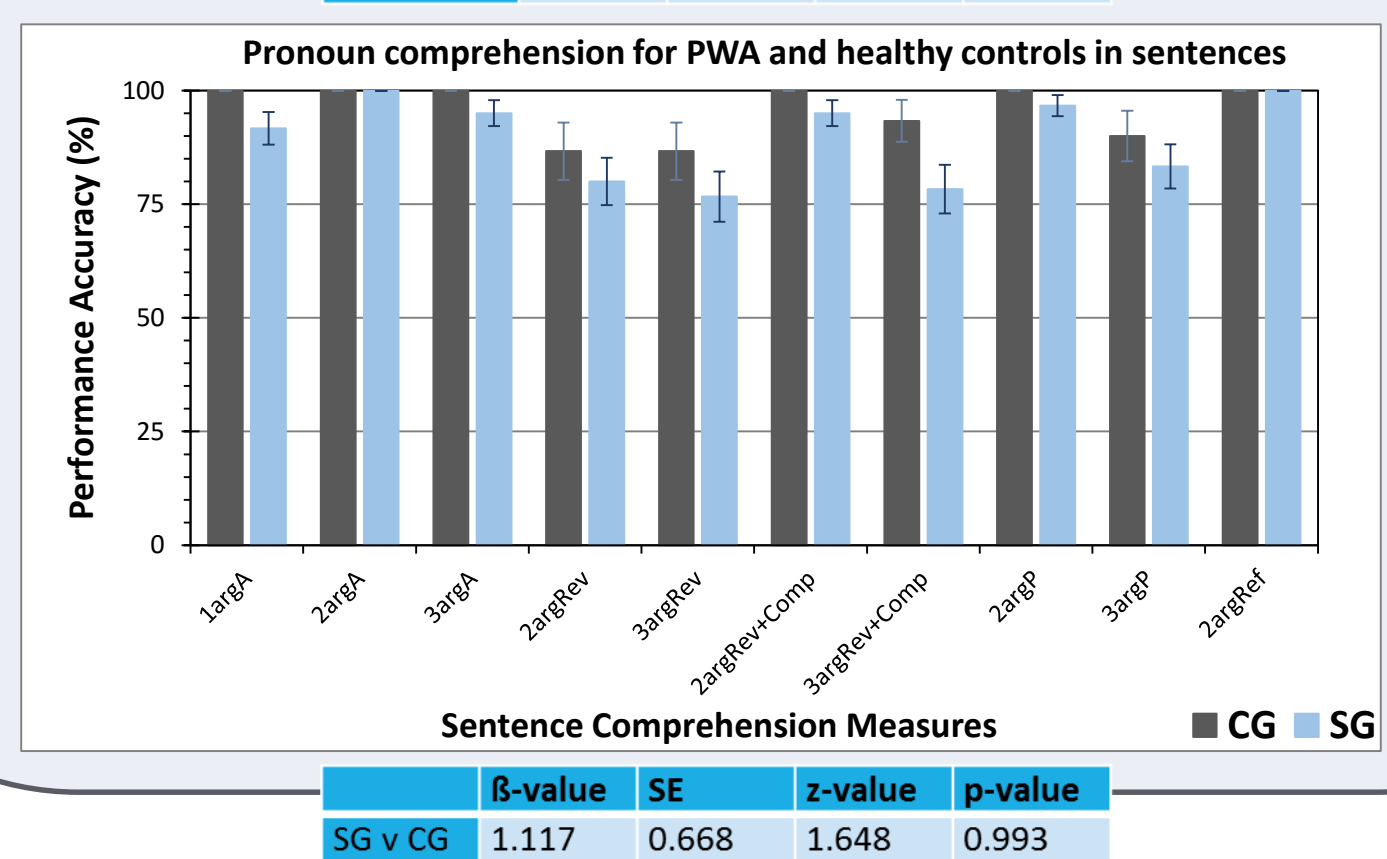
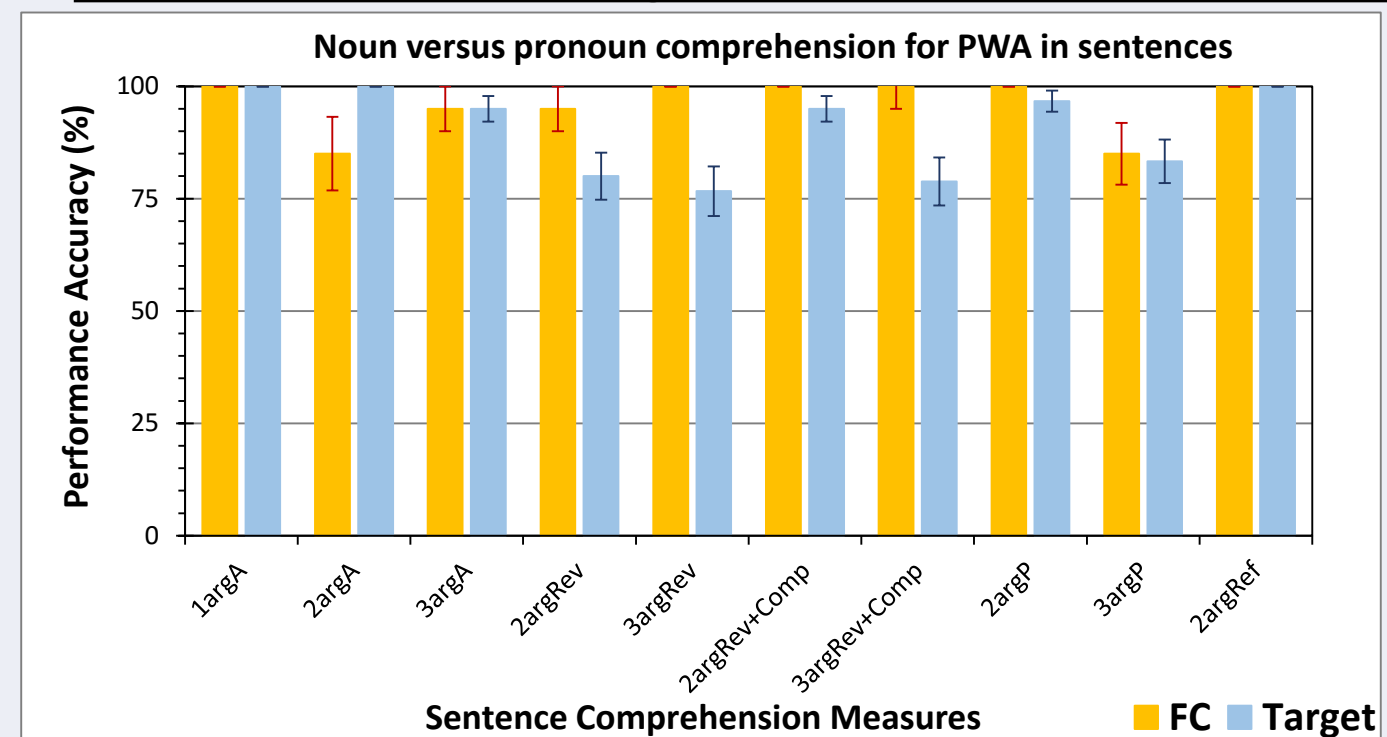
### In discourse:

- 2-, 3-, and 4-sentence discourse structures with nouns and pronouns
- Discourse conditions tested: length (number of sentences in discourse), pronoun competition (inter- and intrasententially)

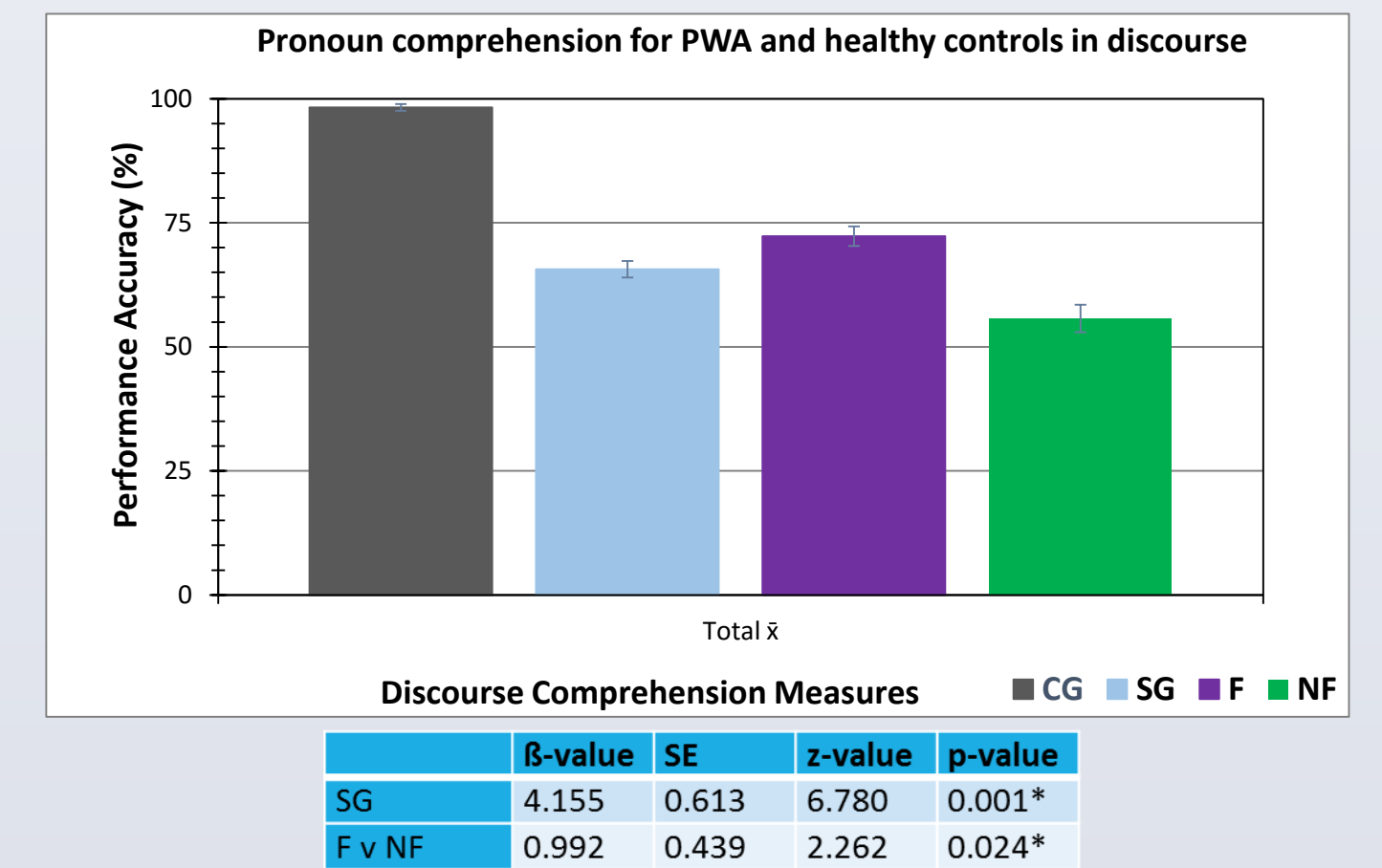
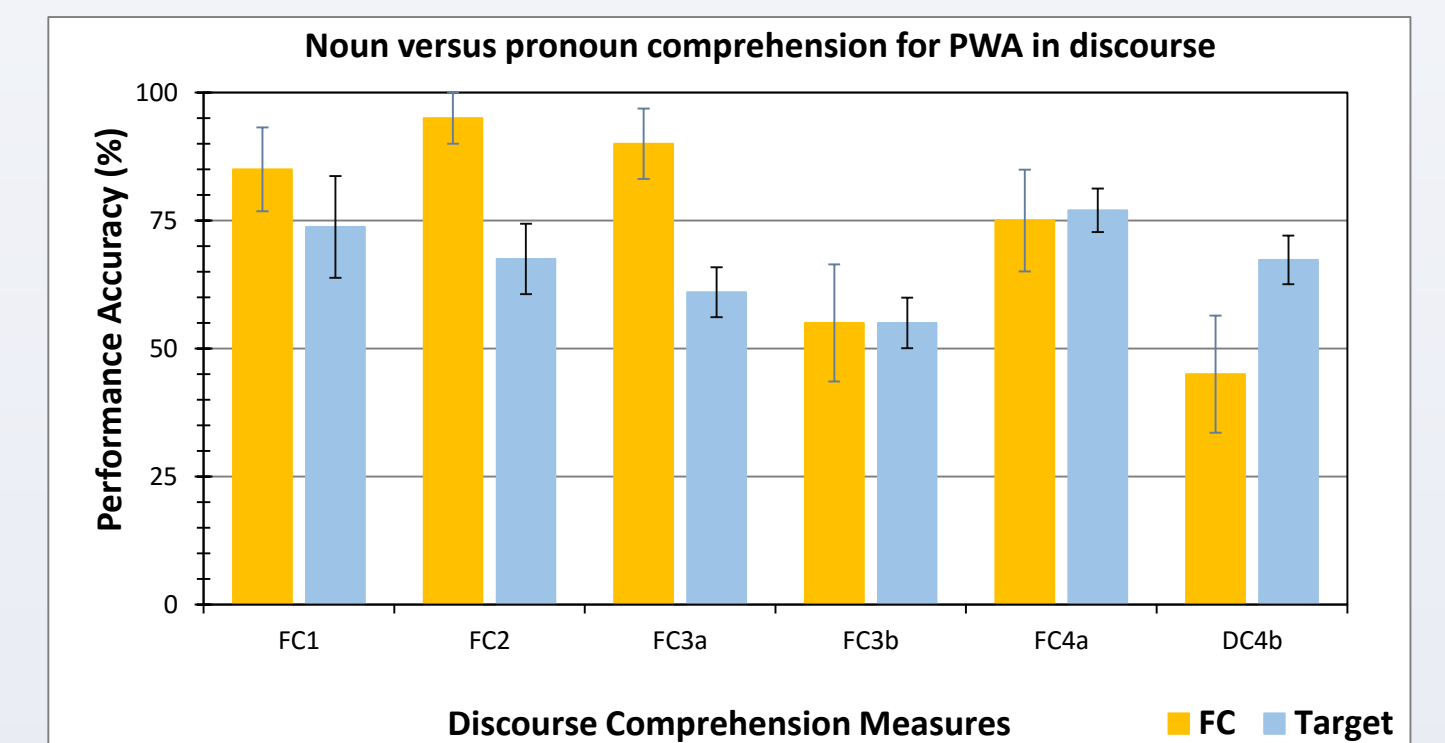
### Data Analysis

Generalized linear mixed model (GLMM) fit by maximum likelihood (Laplace Approximation) (Baayen, Davidson, & Bates, 2008; Barr, Levy, Scheepers, & Tily, 2013; Boeck et al., 2011; Gelman & Hill, 2007).

## Sentence Comprehension Results



## Discourse Comprehension Results



## Discussion

- Pronoun processing difficulties arise when pronouns are processed as explicitly discourse-linked elements rather than when processed as implicitly-discourse linked elements.
- PWA process pronouns similarly to healthy controls when the pronoun and its contextual antecedent occurs within the same sentence.
- Processing multiple pronouns (pronoun competition) does not appear to negatively impact pronoun processing.
- Working memory ability does not appear to be negatively impacted by pronoun processing in PWA.
- People with fluent and nonfluent aphasia process pronouns similarly within sentences.
- People with nonfluent aphasia process pronouns with significantly more difficulty in discourse when compared to people with fluent aphasia.

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