Describing Phonological Paraphasias in Primary Progressive Aphasia

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Introduction

o Phonological paraphasias have been well described in persons with stroke-induced aphasia.

o Phonological paraphasias have been observed in individuals with primary progressive aphasia (PPA), but have not been described in detail.[1]

o However, diagnosis of PPA variants is partially based on the presence and frequency of paraphasias.[2,3]
  - Semantic variant (SvPPA) is associated with few phonological paraphasias.[1]
  - Logopenic variant (LvPPA) is associated with impaired phonology and the greatest number of phonological paraphasias.[1]
  - Nonfluent variant (NFvPPA) is associated with motor planning deficits but may have phonological paraphasias.[1]

o Frequency and characteristics of paraphasias have not been closely examined in connected speech, although there is evidence that the variants produce phonological paraphasias at different rates.[1-3]

o A better understanding of the kinds of phonological paraphasias produced by the three variants may lead to clearer diagnosis and a better understanding of the underlying deficits in each subtype.

o **Specific Aim 1: To describe phonological paraphasias during connected speech in individuals with PPA.**

o **Specific Aim 2: To describe profiles of paraphasia production for each PPA variant.**
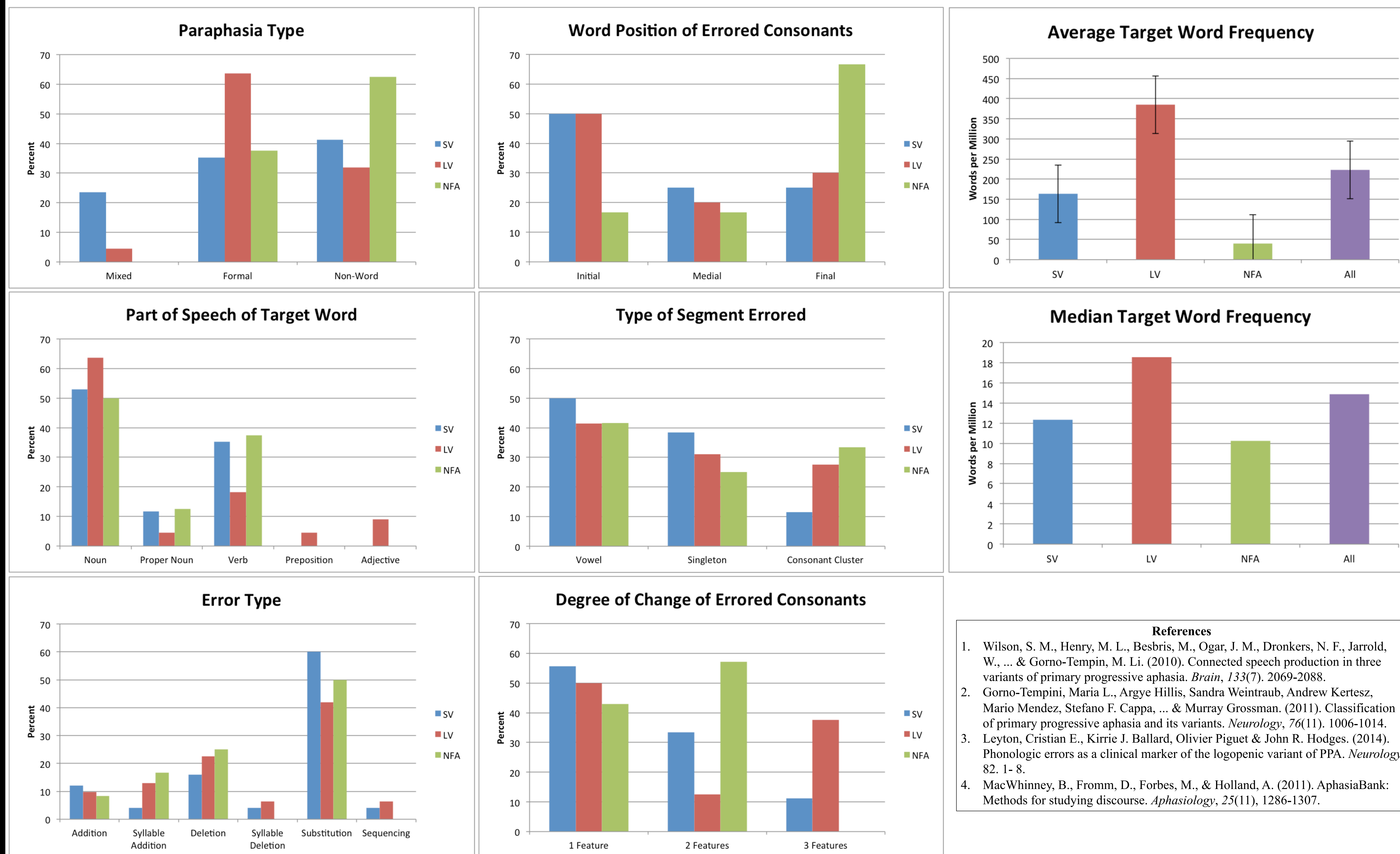
Methods

Participants

o Transcripts from 21 individuals with PPA were used in this study (see Table 1 for demographic information of the 13/21 participants who produced paraphasias).
  - 8 with SvPPA, 9 with LvPPA, 4 with NFvPPA
  - 14 women, 7 men
  - Time post Onset: Mean 45 months (SD 25.3), range 12 to 120 months
  - Age: Mean 72.1 years (SD 6.5), range 58 – 87 years
  - Race: 18 White/European American, 3 African American

Discourse Production

o Participants were asked to retell the Cinderella story and were allowed to look at a picture book as they spoke.

o Discourse samples were transcribed using CHAT format with paraphasia coding.[4]

Phonological Paraphasia Coding

o The rules for the Philadelphia Naming Test were used to identify phonological paraphasias.
  - Mixed errors: phonologically and semantically related real word (e.g., car -> coach)
  - Formal errors: semantically unrelated real word (e.g., cleave -> clean)
  - Non-word errors: phonologically related non-word (e.g., Silerenda -> Cinderella)

o Only errors for which a target word was clearly identified were included
  - Context, self-correction, preserved word form.

o For each paraphasia, the following information was coded:
  - Paraphasia type (mixed, formal, non-word)
  - Part of speech of target word
  - Type of error (addition, deletion, substitution, sequencing)
  - Word position of error
  - Type of segment in error (vowel, consonant singleton, consonant cluster)
  - Degree of change (for consonants only)
    - 1-3 based on changes in voice, place and manner of articulation
  - Target word frequency

Paraphasia Type

Word Position of Errored Consonants

Average Target Word Frequency

Part of Speech of Target Word

Type of Segment Errored

Median Target Word Frequency

Error Type

Degree of Change of Errored Consonants

References

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Results

Table 1. Demographic information for participants who produced paraphasias.

		All (N = 13)	Logopenic (N = 5)	Nonfluent (N = 3)	Semantic (N=5)
Gender		9 Women 4 Men	3 Women 2 Men	2 Women 1 Men	4 Women 1 Men
Age	Mean (SD)	70.7 (7.1)	69 (6.7)	78 (8.2)	68.2 (4.6)
	Median	70	70	76	67
	Range	58 – 87	58 – 76	71 – 87	64 – 76
Education	Mean (SD)	16.2 (3)	18.8 (1.1)	15.3 (3.1)	14.2 (2.7)
	Median	18	18	16	13
	Range	12 – 20	18 – 20	12 – 18	12 – 18
Race		10 W/EA 3 AA	4 W/EA 1 AA	1 W/EA 2 AA	5 W/EA
TPO (months)	Mean (SD)	44.5 (22)	37.6 (19.2)	42.7 (28.4)	52.4 (23.4)
	Median	48	36	48	48
	Range	12 – 78	12 – 66	12 – 68	18 – 78

TPO: Time post onset; AA: African American; W/EA: White/European American

Discussion

o Individuals with SvPPA produced more phonological paraphasias than would be expected from the literature.
  - They produced more mixed paraphasias than the other subtypes, but produced more formal and non-word paraphasias than mixed.

o Individuals with LvPPA produced paraphasias on both content words and function words (nouns, verbs, prepositions, and adjectives).
  - Individuals with SvPPA and NFvPPA only produced paraphasias on content words.

o Individuals with NFvPPA produced paraphasias on lower frequency words than individuals with SvPPA and LvPPA.

o Individuals with LvPPA produced more consonant errors that differed by all three features than the other subtypes.

o A better understanding of phonological paraphasias may aid in more accurate diagnosis of PPA subtypes and could also lead to improved patient education regarding the difficulties and errors to be expected as the disease progresses.

o Next steps should investigate paraphasias in a larger sample, controlling for time post onset.