Connected Language in Primary Progressive Aphasia: Testing the Utility of Linguistic Measures in Differentially Diagnosing PPA and its Variants

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RESEARCH QUESTIONS

1. Can a brief language sample differentiate between Primary Progressive Aphasia (PPA), healthy aging, Mild Cognitive Impairment (MCI) and Alzheimer's disease (AD)?
2. Which linguistic measures obtained from a brief language sample best differentiate between PPA variants?

BACKGROUND

- The primary deficit in PPA is language decline caused by neurodegenerative disease (Mesulam 2001, 2007)
- However, some language decline is also characteristic of healthy aging, MCI, and AD (Kemper et al., 2001; Spieler & Griffin, 2006; Taler & Philips, 2008)
- **There is currently little uniformity in measures used to quantify language abilities in aging and neurodegenerative conditions**
- Additionally, the heterogeneous language profiles of PPA variants adds to the challenge of quantifying linguistic impairments in PPA. The 3 primary variants are (Gorno-Tempini et al., 2011):
  - *Agrammatic/Nonfluent (PPA-G)*: nonfluent speech, poor syntax
  - *Semantic (PPA-S)*: word retrieval difficulties
  - *Logopenic (PPA-L)*: word retrieval difficulties, frequent pauses
- **There is need for further research on identifying a brief, simple to administer, and reliable test to aid in differentiating language changes in healthy aging from neurodegenerative conditions**
- Further research is also needed on linguistic differences between PPA variants

METHODS

Participants

- Groups matched for age (M= 67yrs) & education (M = 15.3yrs) (ANOVA, p>.05)
- PPA subgroups (PPA-G N=10, PPA-S N=7, PPA-L N=9) matched on language and FTD-CDR severity (Broe et al., 2003; ANOVA, p>.05)

Group	CONTROL	PPA	MCI	AD
N	24	26	20	20

Experimental Task

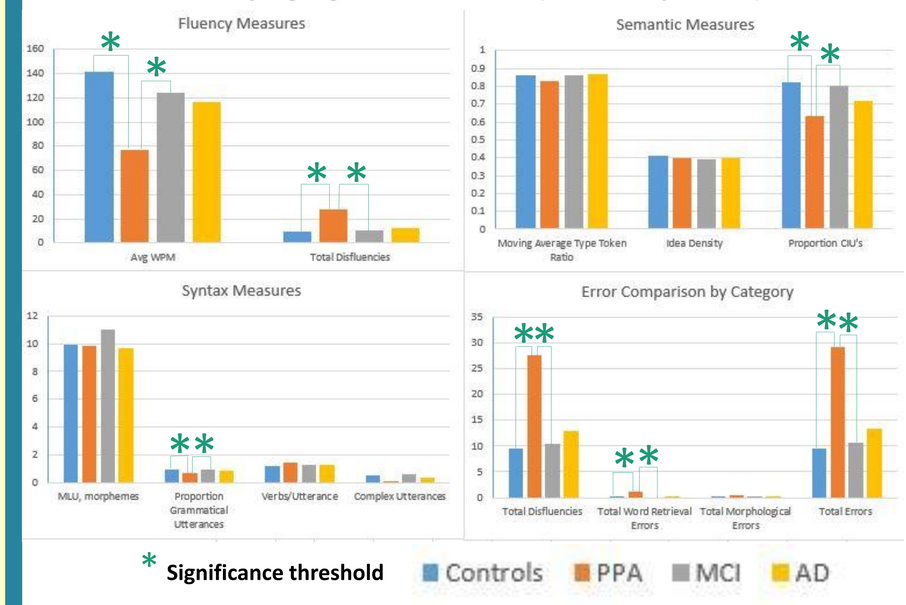
- Cookie Theft picture description from the Boston Diagnostic Aphasia Examination (BDAE; Goodglass & Kaplan, 1983)
- Narratives from: DementiaBank database (Becker et al., 1994) for controls, MCI & AD, Tspakini (PPA)

Language Analysis

- CHAT transcription format using CLAN (MacWhinney, 2000)
  - EVAL and FREQ programs to calculate measures of fluency, word retrieval, and syntax
- Manual calculations for words per minute and Correct Information Units (Nicholas & Brookshire, 1993)

RESULTS & DISCUSSION

1. PPA vs. healthy aging, MCI, and AD (ANOVA, $p < .01$)



Total Word Retrieval Errors includes both semantic and phonemic errors.
Total Errors includes errors across all linguistic categories.

RESULTS & DISCUSSION (Cont.)

1. PPA vs. healthy aging, MCI, and AD (ANOVA, $p < .01$)

- PPA scored worse than controls and MCI on words per minute (WPM), disfluencies produced, proportion of Correct Information Units (CIU), word retrieval errors, proportion of grammatical utterances, and total number of errors
- No difference between PPA and AD

2. PPA-G vs. PPA-L vs. PPA-S (Kruskal-Wallis, $p < .01$)

- PPA-G scored worse than PPA-L and PPA-S groups on words per minute, idea density, MLU, and verbs/utterance
- No difference between PPA-L and PPA-S

-A brief language sample can distinguish PPA from controls and MCI based on six measures:

- Speech rate (Ash et al., 2013) , disfluencies (Ash et al., 2013) , CIU, proportion of grammatical utterances (Ash et al., 2013), total word retrieval errors, and total errors
- Automated measures from CLAN/EVAL did not differentiate groups
  - Idea density calculation excludes nouns, likely resulting in no difference

-Word retrieval difficulties are likely a pervasive feature of PPA and impact communicative success

-In this AD sample, language measures were similar to PPA

- Language decline in advanced AD (Taler & Phillips, 2008)

-PPA-G differs from other subgroups on syntactic measures, speech rate, and idea density; no differences found between PPA-S and PPA-L

- Small group sizes and severity matching among PPA groups might have resulted in similarities

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