

## Introduction

- Speech is a complex behavior. Cognitive impairment in one domain may affect patients' performance, thus providing opportunities to identify disease markers.
- A limited number of studies have examined natural connected speech in typical and atypical Alzheimer's disease (AD).
- Here we implement automated language processing to characterize some semantic properties of speech in speakers with typical AD and its language-specific variant, logopenic variant primary progressive aphasia (lvPPA).

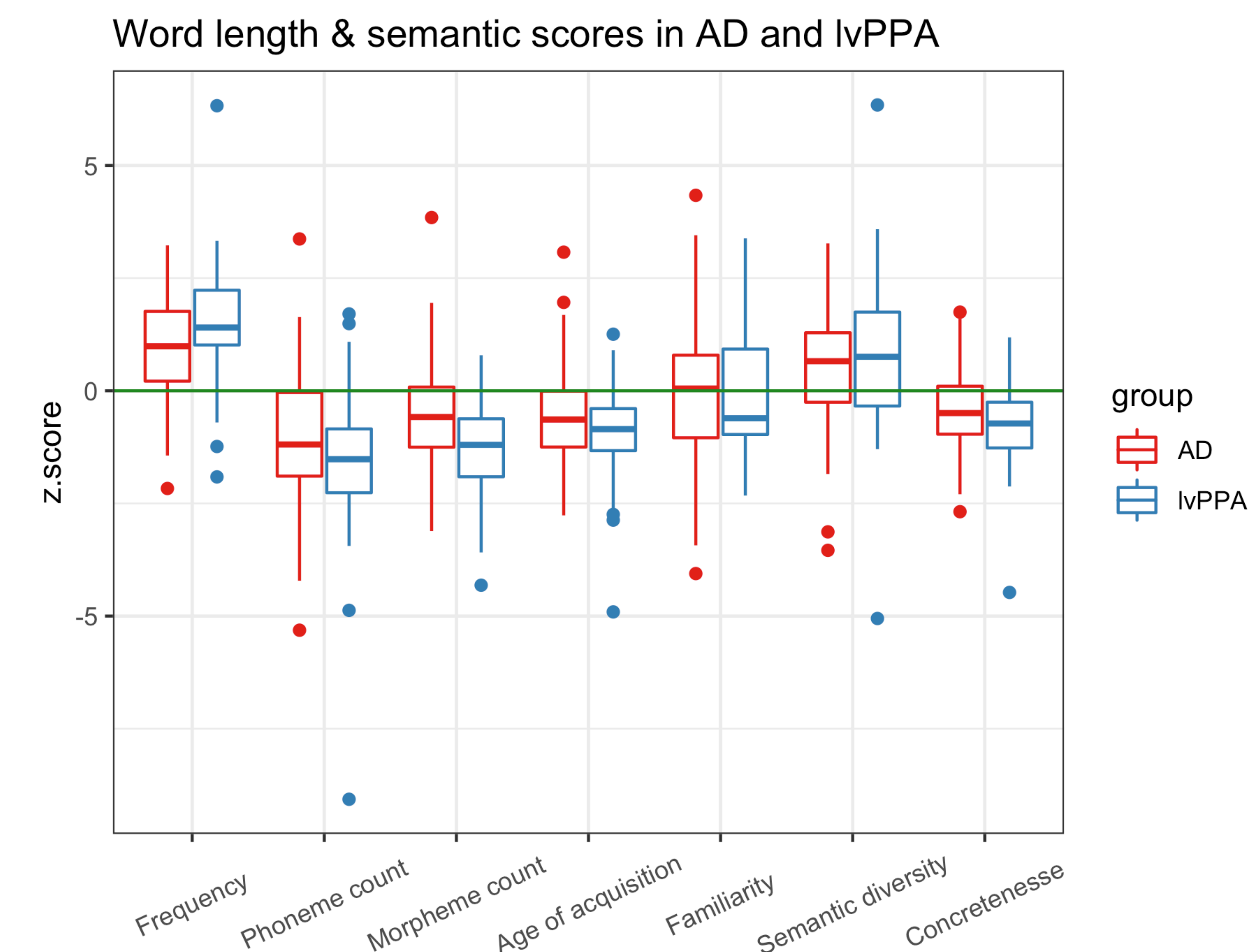
## Participants & Methods

Table 1: Clinical & Demographic characteristics (Means (sd))

	AD	lvPPA	Control	p
n	93	38	36	
Sex = Male (%)	51 (54.8)	17 (44.7)	17 (47.2)	0.509
Education (y)	26.24 (102.01)	15.55 (3.13)	16.03 (2.63)	0.681
Age (y)	67.02 (9.73)	67.62 (8.64)	68.15 (6.89)	0.802
MMSE (0-30)	21.05 (5.37)	22.21 (5.85)	29.14 (0.99)	<0.001

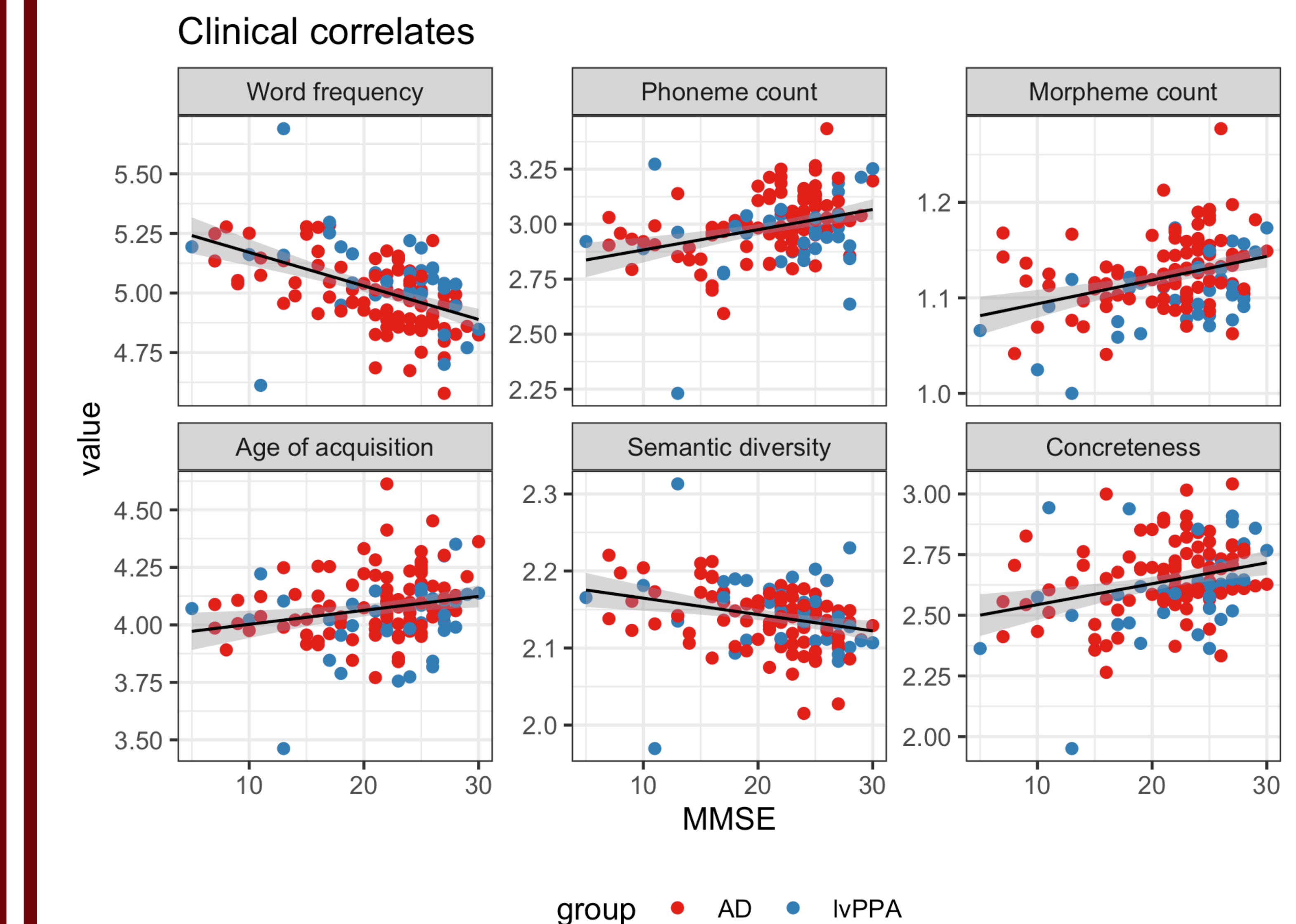
- We analyzed transcripts of natural speech elicited by a picture description task from AD, lvPPA and matched control speakers (Table1).
- We automatically parsed and tagged each word and then automatically scored for word length (in phonemes and morphemes), frequency, familiarity, semantic diversity and concreteness based on published norms.
- We compared these features across groups, covarying for age, sex, education and Mini Mental Status Examination (MMSE) score.
- We correlated each acoustic measure with MMSE scores collected within 6 months of the speech samples.

## Results



- AD and lvPPA speakers used higher frequency words ( $p<0.001$ ) that were shorter (phoneme count,  $p<0.001$ ; morpheme count,  $p<0.001$ ), more ambiguous ( $p=0.028$ ) and abstract ( $p=0.005$ ) and acquired at a younger age compared to control speakers.
- lvPPA speakers' words had fewer morphemes (mean  $1.104 \pm 0.037$ ) compared to AD (mean  $1.129 \pm 0.038$ ),  $p=0.002$ ).
- lvPPA speakers showed a trend towards using higher frequency words ( $p=0.057$ ), acquired at a younger age ( $p=0.05$ ) compared to AD speakers.
- lvPPA speakers differed from controls in their semantic diversity ( $p=0.02$ ).

## Results



- Lower MMSE scores in patient speakers are correlated with greater word frequency, shorter word length, younger age of acquisition, greater semantic diversity, and lower concreteness scores.

## Conclusions

- In natural speech, AD and lvPPA speakers select words that are shorter, more frequent, more semantically ambiguous and less concrete.
- lvPPA speakers show a specific predilection for words with fewer morphemes and higher frequency, acquired at an earlier age.
- These deficits correlate with the degree of cognitive impairment.

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