

Speech and language features in MCI due to AD or other types of MCI in a Korean population

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Introduction

- MCI is a heterogeneous condition with multiple subtypes.
- Although previous studies have investigated various speech and language characteristics of MCI-AD [cite], studies directly comparing both acoustic and lexical features across different MCI subtypes remain scarce, leaving an important gap in the literature.
- This study compares speech and language features in MCI due to Alzheimer's disease (MCI-AD) to those in β -amyloid negative MCI with Lewy body (MCI-LB).

Methods

- Korean participants with MCI-AD (n=32, age=77.12 $\pm$ 5.62 years, education=10.78 $\pm$ 4.32 years) or MCI-LB (n=23, age=76.91 $\pm$ 7.35 years, education=8.83 $\pm$ 4.33 years) and healthy adults (HC; n=38, age=74.16 $\pm$ 6.32 years, education=9.45 $\pm$ 3.83 years) completed a speech collection protocol (Table 1).
- β -amyloid positivity was confirmed with visual assessment of ¹⁸F-Florbetaben PET.
- Recordings were automatically transcribed using ASR and manually corrected by trained annotators.
- We automatically extracted lexical features (e.g., counts of part-of-speech categories per 100 words) from a picture description task and acoustic features (e.g., loudness, pitch) from a sustained phonation task.
- Age and sex were covaried in all analyses, and p-values were adjusted using false discovery rate.

	HC (N=38)	MCI-LB (N=23)	MCI-AD (N=32)	p-value
Sex (% of Male participants)	19 (50.0%)	17 (73.9%)	15 (46.9%)	0.102
Age (years)	74.16 (6.32)	76.91 (7.35)	77.12 (5.62)	0.105
Education (years)	9.45 (3.83)	8.83 (4.33)	10.78 (4.32)	0.193
MMSE (0-30)	N/A	24.87 (2.67)	24.38 (4.03)	0.59
CDR-SB (0-18)	N/A	3.76 (2.42)	4.14 (2.06)	0.55
Language (SNSB; 0-27)	11.99 (1.62)	10.00 (2.63)	10.43 (2.17)	< 0.001
Memory (SNSB; 0-144)	73.21 (17.21)	44.61 (15.94)	34.38 (16.38)	< 0.001
Attention (SNSB; 0-17)	10.32 (1.73)	8.91 (1.88)	9.84 (1.95)	0.019
Visuospatial (SNSB; 0-36)	33.53 (2.72)	26.04 (8.36)	30.06 (6.26)	< 0.001
Frontal/executive (SNSB; 0-55)	34.54 (7.33)	26.20 (8.46)	29.69 (9.07)	< 0.001
UPDRS Part-III (0-20)	3.62 (5.38)	13.05 (7.57)	4.50 (4.49)	< 0.001

Table 1. Demographic and clinical characteristics of participants. Standard deviation (SD) values are in parenthesis, except Sex. MMSE: Mini-Mental State Exam, CDR-SB: Clinical Dementia Rating Sum of Boxes, UPDRS: MDS-Unified Parkinson's Disease Rating Scale, SNSB: Seoul Neuropsychological Screening Battery.

Results

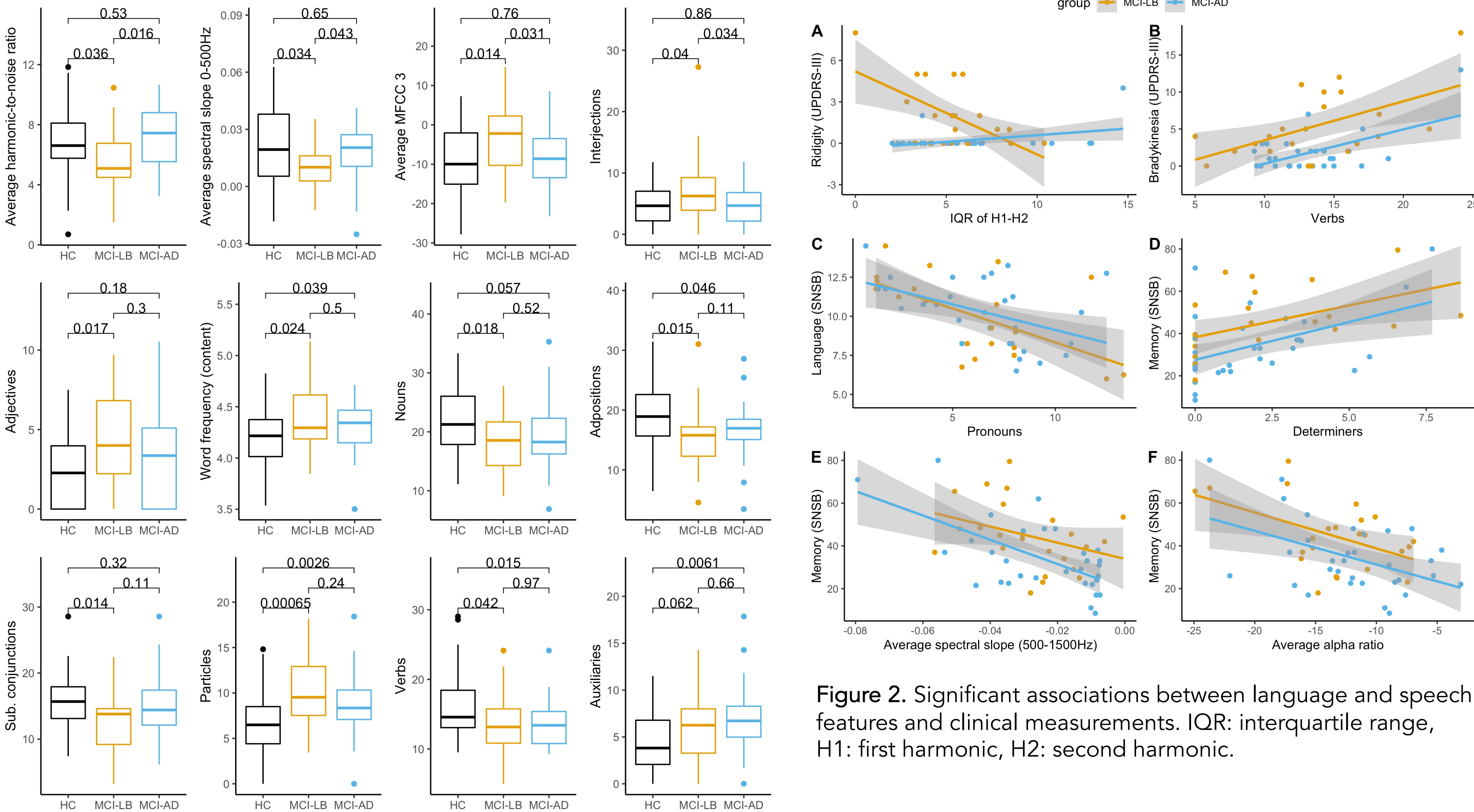


Figure 1. Acoustic and lexical features with significant group differences.

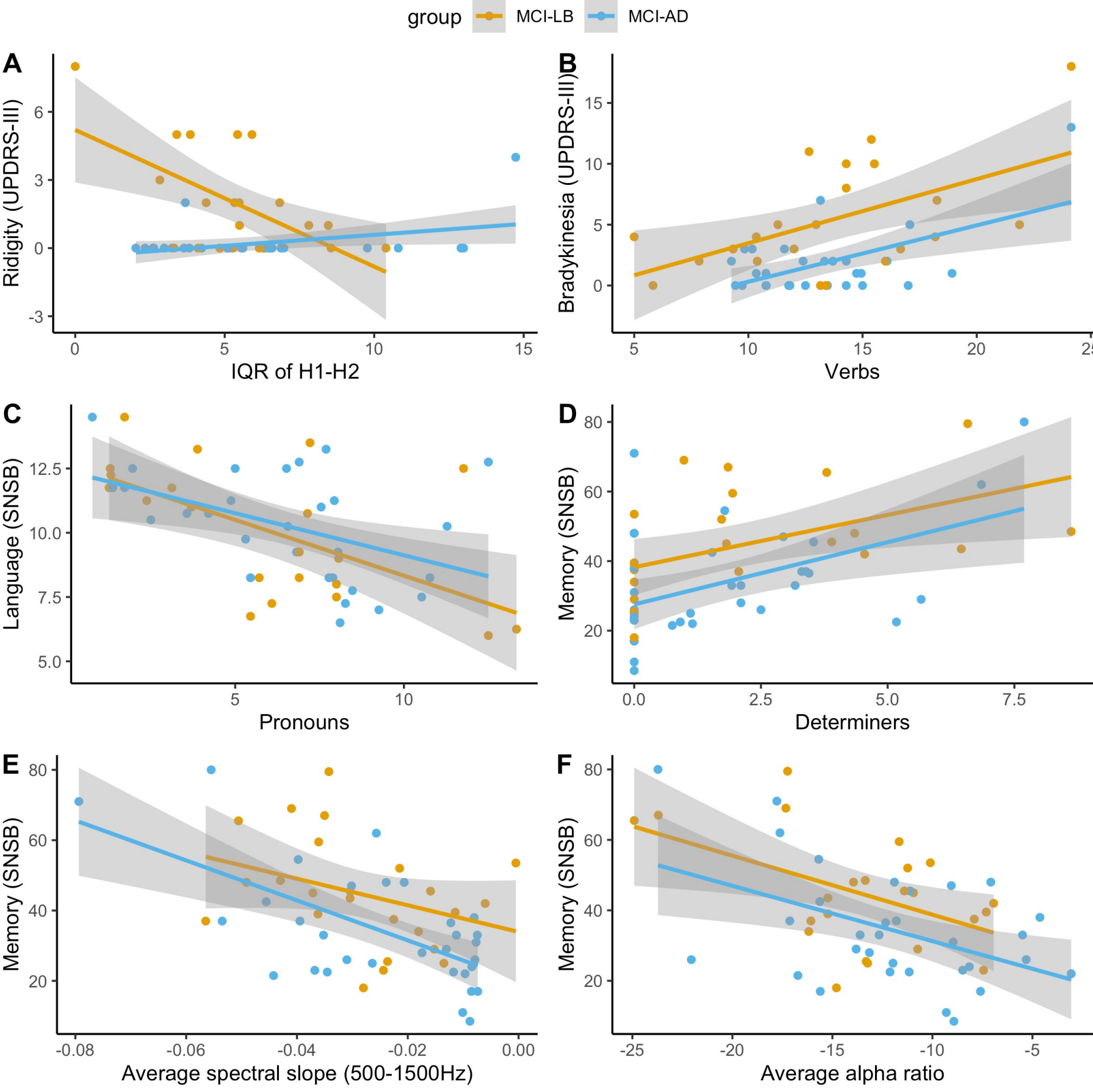


Figure 2. Significant associations between language and speech features and clinical measurements. IQR: interquartile range, H1: first harmonic, H2: second harmonic.

Discussion & Conclusion

- Individuals with MCI-LB exhibited breathier and less stable phonation, as reflected by lower harmonic-to-noise ratio values, and produced more interjections than both individuals with MCI-AD and HCs. The MCI-LB group also differed significantly from HCs on several acoustic measures associated with hypophonia and reduced vocal fold control, whereas the MCI-AD group showed no significant differences from HCs on those measures.
- The MCI-LB and MCI-AD groups also differed significantly from HCs on a number of lexical features.
- Several of the acoustic and lexical features were associated with clinical measures of cognitive and motor functioning.
- Results highlight the potential of using speech as an early screening tool of patients with different MCI subtypes.

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