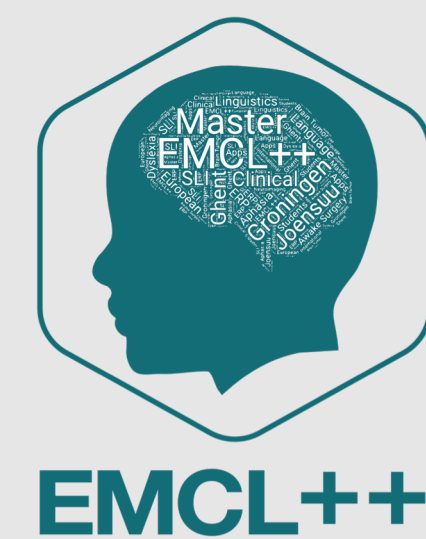




# A COMPARISON OF DIFFERENT CONNECTED-SPEECH TASKS FOR DETECTING MILD COGNITIVE IMPAIRMENT USING MULTIVARIATE PATTERN ANALYSIS



## Background

Mild cognitive impairment (MCI) is an umbrella term that describes a clinically detectable transition stage from typical to pathological aging. Word-retrieval difficulties are the main difficulties in MCI and early Alzheimer’s disease (e.g., Taler & Phillips, 2008). A growing consensus indicates that a multidimensional and ecologically valid way to detect language deficits is needed in both typical and pathological aging, such as connected-speech assessment (Boschi et al., 2017).

## Research questions

- (1) Do people with MCI perform differently than cognitively healthy controls on lexical-semantic features, in four types connected-speech tasks?
- (2) Can the pattern of lexical-semantic features classify participants with MCI, using MVPA?
- (3) If so, which connected-speech task and which lexical-semantic feature would be more discriminant to detect MCI?

## Methods

**Participants:** 16 English-speaking participants with MCI (12 females; 70.8±6.4 years old) and 16 cognitively healthy controls (12 females; 70.8±6.4 years old) from the Delaware corpus available on DementiaBank (Lanzi et al., 2023)

**Materials:** Four connected-speech tasks (a picture description, a story narrative, a story recall, and a procedural narrative)

**Lexical-semantic features:** word revision ratio, repetition ratio, filled pauses ratio, word replacement ratio, core lexicon, propositional idea density, open/closed class words ratio, and the lexical frequency

**Statistical analyses:** Two-way analysis of variance (ANOVA) + Multivariate pattern analyses (MVPA)

## Results

### Main effect of group

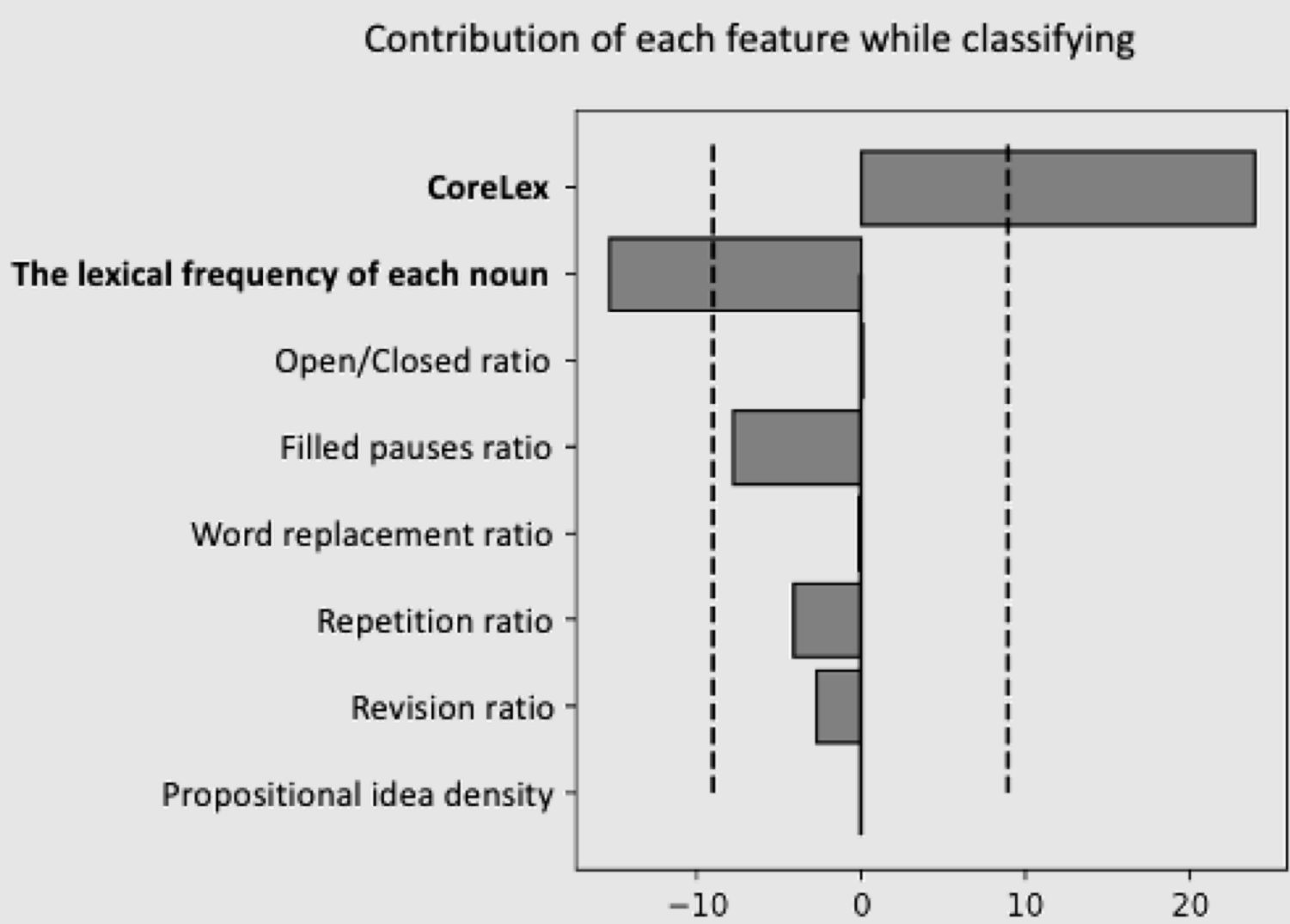
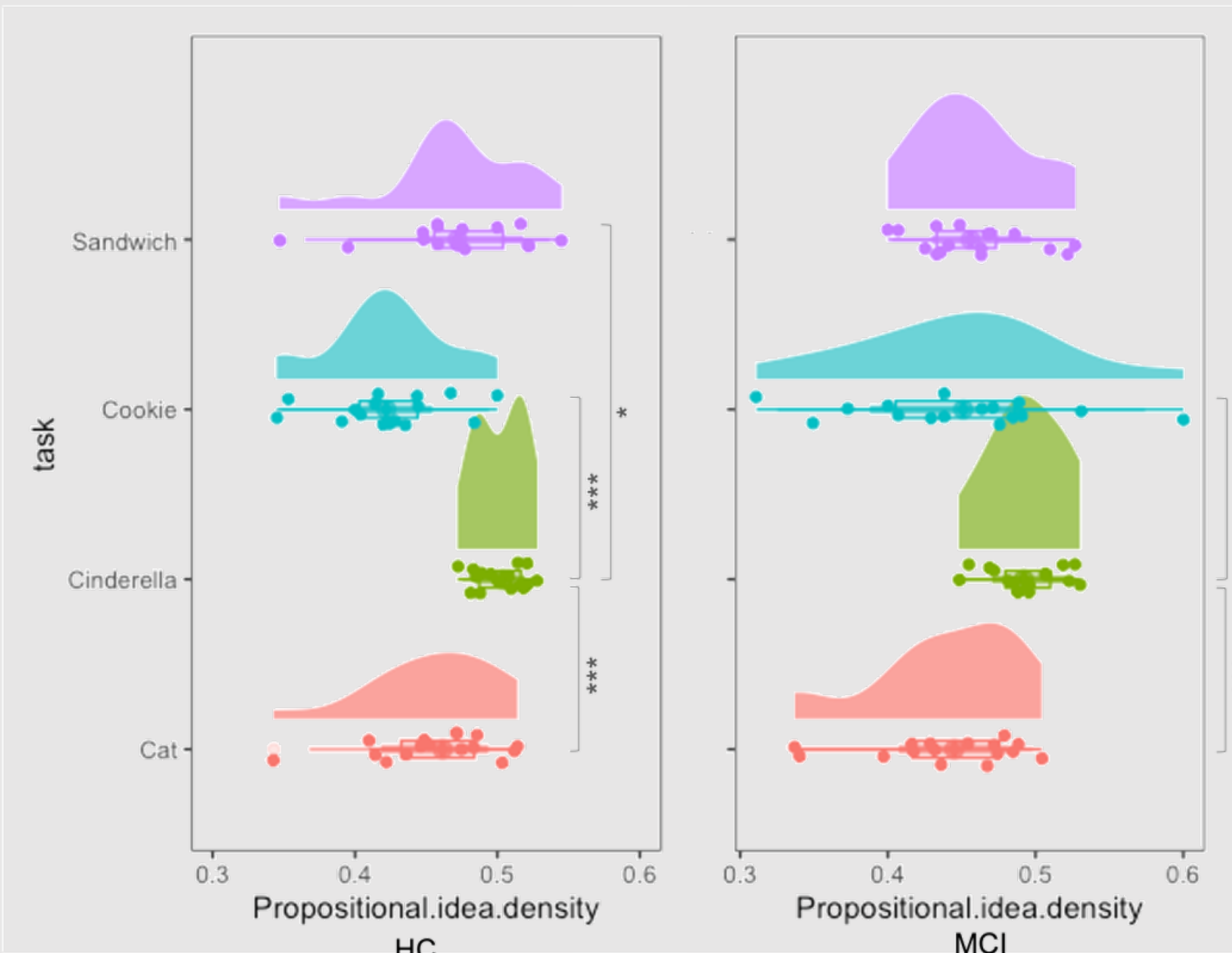
MCI = higher proportion of revisions ( $F(1,123) = 4.729, p = 0.032$ ), fewer CoreLex checklist words ( $F(1,123) = 5.506, p = 0.021$ )

### Main effect of task

Propositional idea density ( $F(3,123) = 11.706, p < 0.001$ ), lexical frequency of each noun ( $F(3,123) = 16.375, p < 0.001$ ), and CoreLex ( $F(3,123) = 397.854, p < 0.001$ ).

### MVPA results

The story recall could distinguish the two groups above chance (accuracy: 65.6%). CoreLex and lexical frequency = features that contributed the most to the classification.



## Discussion

- Connected-speech tasks can detect subtle language changes in people with MCI.
- By using MVPA, the pattern of lexical-semantic features could significantly predict participants’ membership (MCI or HC) in one of the four tasks.
- The story recall task could discriminate participants with MCI above chance

## References

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Lanzi, A. et al. (2023). DementiaBank: Theoretical Rationale, Protocol, and Illustrative Analyses.(Tutorial). *American Journal of Speech-Language Pathology*, 32(2), 426(413).

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