AUTOMATIC DETECTION OF ALZHEIMER’S FROM SPEECH USING SPATIAL NEGLECT MARKERS
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INTRODUCTION
- Machine learning can distinguish patients with Alzheimer’s disease (AD) versus healthy controls using transcripts of descriptions of the “Cookie Theft” picture
- We evaluated the diagnostic utility in adding markers of spatial neglect to our previous baseline algorithm.

METHODS
- Corpus: DementiaBank dataset
  - 499 interviews (257 AD, 242 control)
- Baseline algorithm: 353 lexical and acoustic markers
- Three approaches to dividing the Cookie Theft image: halves, strips and quadrants, using four measures:
  1. Number of info-units (I-U) mentioned,
  2. ratio of I-U to all words,
  3. ratio of unique I-U to all possible I-U in region,
  4. ratio of unique I-U to total mentioned I-U
- Included quadratic interaction terms between regions
- 10-fold cross-validation with correlation-based feature selection preprocessing
- Trained logistic regression model using each spatial approach, then compared against baseline

RESULTS

<table>
<thead>
<tr>
<th></th>
<th>PPV (95% CI)</th>
<th>NPV (95% CI)</th>
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</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>.83 (.79 - .87)</td>
<td>.81 (.74 - .88)</td>
</tr>
<tr>
<td>Halves</td>
<td>.84 (.80 - .86)</td>
<td>.81 (.74 - .88)</td>
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<tr>
<td>Strips</td>
<td>.84 (.77 - .91)</td>
<td>.82 (.76 - .88)</td>
</tr>
<tr>
<td>Quadrants</td>
<td>.81 (.74 - .87)</td>
<td>.81 (.75 - .87)</td>
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</tbody>
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CONCLUSION
- Adding hemispatial neglect markers created a trend towards improved predictive value of the algorithm and warrants further study
- Application of this approach for more localized neurodegenerative processes may have more improved predictive values
- Future directions will include assessment of patients with subjective cognitive impairment and integration of clinical information

FEATURE TYPES
- Parts of speech/context-free grammar (59)
- Vocabulary richness/ syntactic complexity (32)
- Psycholinguistic/Repetitiveness (10)
- Spatial neglect (40)
- Info Units (40)
- Acoustic (172)