## Research Goals

- Use content of recognition errors to discover what words are being activated in the lexicon during spoken word recognition
- Test predictions made by theories of word recognition in terms of neighborhood density
- Is the traditional definition of a neighbor (1 phoneme deletion, addition or substitution) (Greenberg & Jenkins, 1964; Luce, 1986, Luce & Pisoni, 1998) sufficient to account for multisyllabic words?

## Materials

- 1285 English words chosen from the Hoosier Mental Lexicon (Nusbaum et al., 1984), designed to be a representative sample of the entire English lexicon, based on:
  1. Number of phonemes (1-13)
  2. Number of syllables (1-5)
  3. Syllable structure
  4. Initial phoneme
  5. Lexical frequency
- Recorded by a single male talker

## Participants

- 95 native English-speaking undergraduates from IU (so far)

## Task — Open-set word recognition in noise

- Participants heard the recorded materials over headphones and entered responses via keyboard.
- 6 talker babble was added to the stimuli at 3 different signal-to-noise ratios (S/N): 0, 5, and 10 dB
- Materials were presented at 77 dB SPL.
- Each listener heard only 1/4 of the stimulus list; 1/3 of the stimuli were presented at each S/N ratio.

## Analysis

- Responses were converted into phonetic transcriptions semi-automatically.
- Analysis here included 8548 incorrect responses (4324 at S/N = 0, 2599 at S/N = 5, and 1625 at S/N = 10)

## Results

### Psycholinguistic Correlations

#### Table

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD</td>
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<td>0.35</td>
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<tr>
<td>FG</td>
<td>2.00</td>
<td>1.50</td>
</tr>
<tr>
<td>Familiarity</td>
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<td>1.00</td>
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<tr>
<td>Neighborhood</td>
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</table>

#### Figures

- **Figure 1**: Percent correct for each S/N ratio used.
- **Figure 2**: Distribution of percent correct by subjects and items.
- **Figure 3**: Percent correct as a function of different psycholinguistic properties of the target words. Points in the syllable plot have been randomly scattered along the x-axis in order to minimize point overlap.
- **Figure 4**: Anterior-posterior ACC activity is related to the frequency of incorrect responses to an unknown message set.
- **Figure 5**: Patterns of results are consistent across different S/N ratios.

### Discussion

- Preliminary results suggest that the traditional definition of neighborhood density (one phoneme deletion, addition, or substitution) is not sensitive enough to capture a large portion of the data.
- Patterns of results are consistent across different S/N ratios.
- Contrary to Pollack et al. (1960), our results indicate a small but significant correlation between the frequency of incorrect responses and the frequency of the target word.

### Future Directions

- Include a more detailed measure of similarity between target and response
- Analyze individual target-response pairs to determine whether the patterns regarding frequency, phonemes, syllables are attributable to chance
- Develop a more sensitive definition of neighborhood density

## References