1. Introduction

- /æ/ historically patterns as lax
- Tenseness is phonologically active in English morphophonological processes and phonotactic distribution
- Observation: In Northern Cities Shift, /æ/ appears in all environments
- Question: Does Northern Cities Shift /æ/ belong to the class of tense or lax vowels?
  - Support of tense: vowel is phonetically tense (lengthened, diphthongal like other tense vowels)
  - Support of lax: patterns as lax in lexicon—task, gasp, but /æ/# unattested
- This study: Forced choice nonce word task centered on /æ/ vs. /ɛ/ vs. /i/ vs. /u/ vs. /o/
- Key finding: Northern Cities Shift speakers and California English speakers alike treat /æ/ as lax, preferring it to tense vowels where tense vowels restricted

3. /æ/ is Licit in /Vsk#, Vsp#/

<table>
<thead>
<tr>
<th>Environment</th>
<th>Tense Vowels</th>
<th>Lax Vowels</th>
</tr>
</thead>
<tbody>
<tr>
<td>/V/#</td>
<td>[ʃɪs]/, [ɹɪs]/</td>
<td>[ʃɪsp]/, [ɹɪsp]/</td>
</tr>
<tr>
<td>/V/#</td>
<td>[bæt]/, [loʊt]/</td>
<td>[bæt]/</td>
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<tr>
<td>/V/</td>
<td>[riːt]/, [ɹeɪst]/</td>
<td>[riːt]/, [ɹeɪst]/</td>
</tr>
<tr>
<td>/ŋ/</td>
<td>*[tʊŋ]/, *[hʊŋ]/, *[ʃɪŋ]/</td>
<td></td>
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<tr>
<td>/VfS/ (monomorphones)</td>
<td>*[ʃɪp]/, *[ɹɪp]/, *[dɛsp]/, *[kɪp]/</td>
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Table 1: Three /æ/ systems in North American English dialects

Logistic Mixed Effects Model
- Three fixed factors: height and tenseness of other vowel, difference in transitional probability between nonce pair
- Random factor of participant
- Test for interaction between participant group and height/tenseness of other vowel
- /æ/ favored in comparison to [+high] (β=.63920, p=.00020), tense vowels (β=.66487, p=.00009)
- Larger differences in transitional probability favored /æ/ (β=.28549, p=.00178)
- No group interaction or inherent favoring of /æ/ (Intercept: p=.05711)
- Speakers phonologize restriction on tense vowels in /Vsk#, Vsp#, treat /æ/ as licit

4. /æ/ is Part of Lax Vowel Class

<table>
<thead>
<tr>
<th>Word</th>
<th>Canadian English</th>
<th>California English</th>
<th>Northern Cities Shift English</th>
</tr>
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<tr>
<td>bat</td>
<td>[bæt]</td>
<td>[bæt]</td>
<td>[bæt]</td>
</tr>
<tr>
<td>bad</td>
<td>[bæd]</td>
<td>[bæd]</td>
<td>[bæd]</td>
</tr>
<tr>
<td>pass</td>
<td>[pæs]</td>
<td>[pæs]</td>
<td>[pæs]</td>
</tr>
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Table 3. Phonotactic distribution of tense and lax vowels in English

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Table 2. Phonomatric distribution of tense and lax vowels in English

Logistic Mixed Effects Model
- Fixed factors: lax vowel, group, transitional probability
- Random factor: participant
- Height effect both alone and as group interaction
- General restriction on tense vowels in /Vsk#, Vsp# for both dialects

5. Discussion

- Implication for Northern Cities Shift: Natural class membership of /æ/ derived from attested lexical items, not phonetic similarity (long and diphthongal) to tense vowels
- English tense/lax distinction surprisingly robust given total lexical items
- Restriction generalized from just 32 tokens (11 /æ/, 10 /i/, 1 /u/, 10 /o/)

Broader Implication: Evidence in favor of phonologically-driven approach to feature classes

- Speakers generalize from attested patterns rather than phonetic similarity
- Further research: Height appeared to have effects on results—novel restriction or task effect?
- Include pre-test to acoustically determine participants use /æ/

2. Methodology

Forced Choice Nonce Word Task
- Speakers known to distinguish between accidental and systematic gaps in well-formedness tasks
- Presentation of minimal pair of nonce words in /Vsk#, Vsp# frames, both lax-only environments (32 lexical items out of 3759 English monomorphemic monosyllables)
- Asked to choose which sounded more like a possible word of English
- Test conditions: /æ/ vs. /i/, /e/, /o/, /u/
- Control conditions: /i/, /e/, /o/, /u/ vs. /æ/
- Filler: codas /b/, /p/, /l/
- 40 test trials, 40 control, 32 filler (1600 total test/control trials)
- Transitional probability calculated as factor for analysis

Participants
- 9 college students raised in Northern Cities Shift-speaking area (Michigan, Chicago, etc.)
- 11 college students raised in California
- Each group heard local variant of /æ/, otherwise same stimuli (Both variants recorded by speaker of New York City English)

Figure 1. Spread of Northern Cities Shift /æ/ (Labov et al. 2006: 189)

Figure 2. 

![Figure 2](image)

Figure 3. 

![Figure 3](image)

Table 6. Feature Specification for /æ/

Table 7. Logistic mixed effects model of choice of lax vowel vs. tense vowel

Selected References