Laryngeal features

Katalin Balogné Bérces
Revision: The larynx with the vocal cords
Sonorants (nasals, liquids, glides + vowels) are inherently voiced: **spontaneous voicing**

Obstruents may contrast for voicing

 Hungarian (and similar languages): true voiced-voiceless distinctions (voiced obstruents with considerable vocal cord vibration)

“voice languages”
English (and similar languages):
- voiceless = stable = "strong" = *fortis* - *aspirated*
- voiced = unstable = "weak" = *lenis* - *unaspirated*

Devoicing of lenis obstruents:

<table>
<thead>
<tr>
<th>Utterance-initial</th>
<th>Utterance-final</th>
<th>Next to a <em>fortis</em> sound</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>(b)</td>
<td>(c)</td>
</tr>
<tr>
<td><em>Bravo!</em> ['brauǝu]</td>
<td><em>Mad!</em> ['mæd]</td>
<td><em>obtain</em> ['ɔb'thɛm]</td>
</tr>
<tr>
<td><em>Good!</em> ['ɡud]</td>
<td><em>Go ahead!</em> ['ɡeɪd]</td>
<td><em>cheesecake</em> ['tʃiːzkʰeɪk]</td>
</tr>
<tr>
<td><em>Zany!</em> ['zæmɪ]</td>
<td><em>Think big!</em> ['tɪŋɡ]</td>
<td><em>bigfoot</em> ['bɪɡfʊt]</td>
</tr>
<tr>
<td><em>Damn!</em> ['dæm]</td>
<td><em>Bob!</em> ['bɒb]</td>
<td><em>egghead</em> ['ɛɡhed]</td>
</tr>
<tr>
<td><em>Very much!</em> ['vɛr]</td>
<td><em>Leave!</em> ['lɪrv]</td>
<td><em>roadster</em> ['rɔdstə(r)]</td>
</tr>
</tbody>
</table>

Lenis obstruents are only really voiced phonetically when surrounded by sonorants: *bravo, bigger, reading*: **passive voicing**
The aspirated-unaspirated contrast is more salient phonetically!
„aspiration languages”
## English vs. Hungarian:

<table>
<thead>
<tr>
<th>(c)</th>
<th>(d)</th>
<th>(e)</th>
<th>(f)</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>Hungarian</td>
<td>Hungarian</td>
<td>Hungarian</td>
</tr>
<tr>
<td><strong>obtain</strong> [əˈbɪθˈem]</td>
<td><strong>matchbox</strong> [ˈmætʃbɒks]</td>
<td><strong>rabtól</strong> [ˈrɑptoːl]</td>
<td><strong>matchbox</strong> [ˈmɛdʒbɒks]</td>
</tr>
<tr>
<td><strong>cheesecake</strong> [ˈtʃiːzkɛik]</td>
<td><strong>baseball</strong> [ˈbeɪsbɔːl]</td>
<td><strong>rézkarc</strong> [ˈreːskɔrts]</td>
<td><strong>baseball</strong> [ˈbeːzboːl]</td>
</tr>
<tr>
<td><strong>bigfoot</strong> [ˈbɪgfʊt]</td>
<td><strong>cookbook</strong> [ˈkʊkboʊk]</td>
<td><strong>hangföl</strong> [ˈhɒŋkfɒl]</td>
<td><strong>tőkből</strong> [ˈtɔɡbɔːl]</td>
</tr>
<tr>
<td><strong>egghead</strong> [ˈɛɡhɛd]</td>
<td><strong>life gear</strong> [ˈlaɪgfɛə(r)]</td>
<td><strong>éghész</strong> [ˈeːkɛʃ]</td>
<td><strong>afgán</strong> [ˈɒvgɛn]</td>
</tr>
<tr>
<td><strong>roadster</strong> [ˈrɔʊdstɛr]</td>
<td><strong>Shoot back!</strong> [ʃʊt ˈbæk]</td>
<td><strong>roadster</strong> [ˈrɔːtstɛr]</td>
<td><strong>kerthől</strong> [ˈkɛrdboːl]</td>
</tr>
</tbody>
</table>
English vs. Hungarian:

<table>
<thead>
<tr>
<th>English</th>
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<tbody>
<tr>
<td>► optional</td>
<td>► obligatory</td>
</tr>
<tr>
<td>► partial or complete</td>
<td>► complete</td>
</tr>
<tr>
<td>► its result is always devoicing</td>
<td>► its result may be devoicing or voicing</td>
</tr>
<tr>
<td>► may be regressive or progressive</td>
<td>► always regressive</td>
</tr>
<tr>
<td>► initial or final devoicing may apply</td>
<td>► no initial or final devoicing</td>
</tr>
</tbody>
</table>
English: progressive voice assimilation of 

<table>
<thead>
<tr>
<th>/z/</th>
<th>/s/</th>
<th>/ɪz/</th>
</tr>
</thead>
<tbody>
<tr>
<td>legs /ˈlegz/</td>
<td>kicks /ˈkɪks/</td>
<td>churches /ˈtʃɜːrəs/</td>
</tr>
<tr>
<td>tabs /ˈtæbz/</td>
<td>blokes /ˈbləʊks/</td>
<td>judges /ˈdʒʊdz/</td>
</tr>
<tr>
<td>heads /ˈheɪdz/</td>
<td>taps /ˈtæps/</td>
<td>bushes /ˈbʌʃz/</td>
</tr>
<tr>
<td>means /ˈmiːnz/</td>
<td>turnips /ˈtɜːrnɪps/</td>
<td>garages /ˈɡeɪrɪdʒz/</td>
</tr>
<tr>
<td>girls /ˈgɜːlz/</td>
<td>hats /ˈhæts/</td>
<td>kisses /ˈkɪz/</td>
</tr>
<tr>
<td>ways /ˈweɪz/</td>
<td>laughs /ˈlaːfz/</td>
<td>buzzes /ˈbʌz/z/</td>
</tr>
<tr>
<td>shows /ˈʃəʊz/</td>
<td>baths /ˈbaːθs/</td>
<td>stretches /ˈstretʃz/</td>
</tr>
</tbody>
</table>
English: progressive voice assimilation of -\textit{s/-ed}

<table>
<thead>
<tr>
<th>/d/</th>
<th>/t/</th>
<th>/\textit{id}/</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{begged} /'begd/</td>
<td>\textit{clicked} /'klikt/</td>
<td>\textit{wanted} /'wontid/</td>
</tr>
<tr>
<td>\textit{robbed} /'r\textit{obd}/</td>
<td>\textit{ripped} /'ript/</td>
<td>\textit{mended} /'mendid/</td>
</tr>
<tr>
<td>\textit{advised} /'ad\textit{vaizd}/</td>
<td>\textit{laughed} /'l\textit{aift}/</td>
<td>\textit{protected} /'pr\textit{e}tektd/</td>
</tr>
<tr>
<td>\textit{depraved} /d\textit{r'prervd}/</td>
<td>\textit{passed} /'pa\textit{st}/</td>
<td>\textit{beheaded} /b\textit{r'hedid}/</td>
</tr>
<tr>
<td>\textit{damaged} /'d\textit{æm\textit{id}d}/</td>
<td>\textit{kissed} /'k\textit{ist}/</td>
<td>\textit{located} /l\textit{e\textit{kertid}/</td>
</tr>
<tr>
<td>\textit{contained} /'k\textit{en\textit{temd}/</td>
<td>\textit{hushed} /'h\textit{ast}/</td>
<td>\textit{paraded} /p\textit{e\textit{riedid}/</td>
</tr>
<tr>
<td>\textit{filled} /'f\textit{ild}/</td>
<td>\textit{stretched} /'stret\textit{f}/</td>
<td>\textit{navigated} /'n\textit{ævige\textit{rtid}/</td>
</tr>
<tr>
<td>\textit{followed} /'f\textit{ol\textit{aud}/</td>
<td>\textit{attached} /ə't\textit{aft}/</td>
<td>\textit{vaccinated} /'væksim\textit{ertid}/</td>
</tr>
</tbody>
</table>
Two forms of aspiration:

short [ʰ]-like sound following the plosive, mentioned above. The other manifestation of aspiration is the devoicing of a following sonorant consonant. In *play* [pʰlei], *plug* [pʰlaɡ], *simplicity*, *attract*, *queen* [kwɪn], *cube* [kjuːb], *liqueur*, *twist*, the underlined sonorant consonants are voiceless. In *tr*/ sequences, the /t/ is aspirated and therefore the /r/ is devoiced, and the resulting [ʈɾ] sounds very much like a /tʃ/, as if it was an affricate. Notice how minimal the difference is between *train* and *chain*. 
The phonology of English consonants: aspiration

<table>
<thead>
<tr>
<th>Word</th>
<th>Type</th>
<th>Time</th>
<th>Closure</th>
<th>Release</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{bay}</td>
<td>voiced</td>
<td></td>
<td>b</td>
<td>e   i</td>
</tr>
<tr>
<td>\textit{spay}</td>
<td>voiceless unaspirated</td>
<td></td>
<td>s p r</td>
<td>e   i</td>
</tr>
<tr>
<td>\textit{spray}</td>
<td>voiceless aspirated</td>
<td></td>
<td>s p r</td>
<td>e   i</td>
</tr>
<tr>
<td>\textit{pay}</td>
<td></td>
<td></td>
<td>p</td>
<td>e   i</td>
</tr>
<tr>
<td>\textit{pray}</td>
<td></td>
<td></td>
<td>p r</td>
<td>e   i</td>
</tr>
</tbody>
</table>
Summary:

Laryngeal processes/phenomena:
- Voice (voiced/voiceless, sonorants vs. obstruents, voice vs. aspiration languages, voice assimilation)
- Devoicing: of sonorants after aspirated /p t k/
  of lenis obstruents
- Aspiration (the spreading of voicelessness of /p t k/ onto the following segment)

Plus:
- Other processes: Glottalization (glottal reinforcement, glottal replacement)
- Related phenomenon: Pre-fortis clipping of vowels

/i:/ in [bi:d] vs. [bit]    <bead> vs. <beat>
(Phonetic shortening of vowels: "clipping")
Recall:

*bean vs. beer*
rule interaction =

rule ordering
The interaction of tapping/flapping and Pre-Fortis Clipping

(3)

<table>
<thead>
<tr>
<th>Vowel phoneme</th>
<th>Fully long</th>
<th>Shortened</th>
</tr>
</thead>
<tbody>
<tr>
<td>/i:/</td>
<td>[i:] be, been, easy, bead, siege, feel</td>
<td>[i] beat, week, piece, beat, teach</td>
</tr>
<tr>
<td>/au/</td>
<td>[a:u] now, town, round, house (v), loud</td>
<td>[au] out, mouse, counting, house (n)</td>
</tr>
</tbody>
</table>

(4)

T-Voicing and T/D-tapping/flapping

t → d → r

d → r

e.g. matter, butterfly, nobody, little

but militate *

right away, not a jōke, get up

writing vs. riding?
Figure 1
Mean durations of vowels preceding flaps from underlying /t/ and /d/.

English is not a voice language, but rather:
"devoiced lenis" = unaspirated:

\[ \text{... s̞g̊a̞r̊ ...} = \text{... sk̊ar̊ ...} \]

no voice assimilation:
\[ *zg \]
English Phonology Lecture

Connected speech

Katalin Balogné Bérces
**Revision:** The phonology of English consonants: L-darkening in RP

<table>
<thead>
<tr>
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<th>dark-L</th>
<th>clear-L</th>
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<tr>
<td></td>
<td>bef. a cons.</td>
<td>bef. a pause</td>
<td>before a vowel</td>
</tr>
<tr>
<td>(a)</td>
<td>spilt</td>
<td>pill</td>
<td>lip</td>
</tr>
<tr>
<td></td>
<td>belch</td>
<td>bell</td>
<td>look</td>
</tr>
<tr>
<td></td>
<td>Albert</td>
<td>rebel</td>
<td>Linda</td>
</tr>
<tr>
<td></td>
<td>else</td>
<td>stale</td>
<td>lateral</td>
</tr>
<tr>
<td></td>
<td>killed</td>
<td>kill</td>
<td>libido</td>
</tr>
<tr>
<td></td>
<td>tallness</td>
<td>tall</td>
<td>lullaby</td>
</tr>
</tbody>
</table>


The choice of allophone is determined by the syllabic position of the consonant.
Revision: The phonology of English consonants: L-darkening in RP

The choice of allophone is determined by the syllabic position of the consonant.

<table>
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<tr>
<th>Syllabic position</th>
<th>Pronunciation</th>
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<tbody>
<tr>
<td>initial</td>
<td>clear</td>
</tr>
<tr>
<td>ambisyllabic</td>
<td>clear</td>
</tr>
<tr>
<td>final</td>
<td>dark</td>
</tr>
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Revision: The phonology of English consonants: L-darkening in RP

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<td><em>pill</em></td>
</tr>
<tr>
<td><em>belch</em></td>
<td><em>bell</em></td>
</tr>
<tr>
<td><em>Albert</em></td>
<td><em>rebel</em></td>
</tr>
<tr>
<td><em>else</em></td>
<td><em>stale</em></td>
</tr>
<tr>
<td><em>killed</em></td>
<td><em>kill</em></td>
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</tr>
<tr>
<td>final</td>
<td>dark</td>
</tr>
</tbody>
</table>

What happens to word-final /l/ in connected speech?
Within and across sentences, the pronunciation of word-final /l/ is determined by the following segment in the same way. While it is dark in *feel* and *feel me*, it is clear in *feel at home*; dark in *spell* and *spell this word* but clear in *spell it*. Compare *kill* and *kill Bill* with *kill you*, *smile* and *smile back* with *smile at me*. **Cross-word ambisyllabicity.**

The choice of allophone is determined by the syllabic position of the consonant.
**Revision:** The phonology of English consonants: R-dropping

<table>
<thead>
<tr>
<th></th>
<th>no /r/</th>
<th>pronounced /r/</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>before a consonant</td>
<td>before a pause</td>
</tr>
<tr>
<td>(a)</td>
<td>(b)</td>
<td>(c)</td>
</tr>
<tr>
<td>York</td>
<td>tired</td>
<td>your</td>
</tr>
<tr>
<td>party</td>
<td>iron</td>
<td>care</td>
</tr>
<tr>
<td>bird</td>
<td>aren't</td>
<td>err</td>
</tr>
<tr>
<td>allergy</td>
<td>feared</td>
<td>refer</td>
</tr>
<tr>
<td>leopard</td>
<td>retirement</td>
<td>teacher</td>
</tr>
<tr>
<td>particular</td>
<td>fires</td>
<td>particular</td>
</tr>
<tr>
<td>bears</td>
<td>rarely</td>
<td>bear</td>
</tr>
</tbody>
</table>

**new homophones:**

**Revision:** The phonology of English consonants: R-dropping

<table>
<thead>
<tr>
<th></th>
<th>no /r/ before a consonant</th>
<th>no /r/ before a pause</th>
<th>pronounced /r/ before a vowel</th>
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<td>teacher</td>
<td>restore</td>
<td>rhyme</td>
</tr>
<tr>
<td>particular</td>
<td>fires</td>
<td>particular</td>
<td>more</td>
<td>tribute</td>
</tr>
<tr>
<td>bears</td>
<td>rarely</td>
<td>bear</td>
<td>centre</td>
<td>shrimp</td>
</tr>
</tbody>
</table>

new homophones:
sore – saw, pour – paw, aren't – aunt, farther – father, fort – fought,
source – sauce, more – maw, tuner – tuna, sort – sought, court –
caught, spar – spa, career – Korea

The (non)pronunciation of R is determined by its syllabic position.
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</tr>
<tr>
<td>ambisyllabic</td>
<td>pronounced</td>
</tr>
<tr>
<td>final</td>
<td>dropped</td>
</tr>
</tbody>
</table>
**Revision:** The phonology of English consonants: R-dropping

What happens to word-final /r/ in connected speech?

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<table>
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<tr>
<th>(e)</th>
<th>(f)</th>
<th>(g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ring</td>
<td>crow</td>
<td>tiring</td>
</tr>
<tr>
<td>routine</td>
<td>pray</td>
<td>boring</td>
</tr>
<tr>
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<td>tribute</td>
<td>error</td>
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<td>shrimp</td>
<td>referee</td>
</tr>
<tr>
<td>restore</td>
<td>Africa</td>
<td>fiery</td>
</tr>
<tr>
<td>retirement</td>
<td>poetry</td>
<td>fuzzy</td>
</tr>
<tr>
<td>rarely</td>
<td>arrive</td>
<td>rarest</td>
</tr>
</tbody>
</table>
Revision: The phonology of English consonants: R-dropping

Linking-R:
more exciting, your eyes, (to) err is (human), care about, centre of, tire us, etc.
between two sentences: e.g., He doesn't care. I do or There's a spider. I'm scared.
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The (non)pronunciation of R is determined by its syllabic position.

Within and across sentences, the pronunciation of word-final R is determined by the following segment.
Cross-word ambisyllabicity.
PLUS...
**Revision:** The phonology of English consonants: R-dropping

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**Intrusive-R:**
visa application, (the) idea is, (the) Shah of (Persia), schwa insertion, law and (order), Gloria Estefan, (cats) claw at (the furniture), (the giant) panda is (an endangered species), etc.
between two sentences: *Try that sofa. It's softer* or *Call Maria. I need her.*

Further **homophones:** e.g., vanilla ice – vanilla rice, Amanda Avon – Amanda Raven, the spa is broken – the spar is broken,
*put the tuna in the box – put the tuner in the box*
Linking-R and Intrusive-R:

(i) They are phonetically identical.

(ii) Both of them characterize the non-rhotic accents of English only – linking and intrusion go hand in hand with R-dropping.

(iii) Since a word-final <r> can only be preceded by a broken tense vowel, a broad lax vowel, or, in unstressed final syllables, a schwa (as the discussion on the R-influence affecting preceding vowels in Chapter 4 shows), it follows that Linking-R always follows one of /ɑː ɔː ə/, that is, a non-high vowel.

(iv) It is a general feature of Intrusive-R in all the non-rhotic accents exhibiting it that it does not appear in a random fashion, but after certain vowels only, namely /ɑː ɔː ə/, that is, after a non-high vowel.

(v) Both Linking-R and Intrusive-R are always sandwiched between two vowels: they are preceded by a (non-high) vowel and followed by another vowel in the next morpheme. That is, both always pop up between vowels in a hiatus (cf. Chapter 3); in fact, they break up, i.e., destroy, the hiatus.
Linking-R and Intrusive-R:

<table>
<thead>
<tr>
<th>before...</th>
<th>pore</th>
<th>paw</th>
<th>spar</th>
<th>spa</th>
<th>manner</th>
<th>manna</th>
</tr>
</thead>
<tbody>
<tr>
<td>a pause</td>
<td>/pɔː/</td>
<td>/pɔː/</td>
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<td>/spaː/</td>
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i. e., historically R-final and historically non-R-final words are treated by speakers analogously
Linking-R and Intrusive-R:

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<thead>
<tr>
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There's no synchronic difference between them – they are THE SAME.
Linking-R and Intrusive-R:

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i. e., historically R-final and historically non-R-final words are treated by speakers analogously.

There's no synchronic difference between them – they are THE SAME

=> they are to be treated in the same way in our model of phonological knowledge
Linking-R and Intrusive-R:

Analytical options?
Linking-R and Intrusive-R:

Analytical options?

(1) both are present in the lexicon (= in the speakers' mental representations)
Linking-R and Intrusive-R:

Analytical options?

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cf., e.g., Harris (1994:262)
Linking-R and Intrusive-R:

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cf. e.g., Broadbent (1991) – see later
shah of
Linking-R and Intrusive-R:

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Tapping/flapping
Tapping/flapping:

- the replacement of /t d/ by the alveolar tap/flap [ɾ] in certain dialects of English, e.g., General American:

<table>
<thead>
<tr>
<th>English</th>
<th>atómic</th>
<th>átom</th>
</tr>
</thead>
<tbody>
<tr>
<td>tea</td>
<td>eighteen</td>
<td>prétty/vánity</td>
</tr>
<tr>
<td>tomato</td>
<td>potáto</td>
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<tr>
<th></th>
<th>atómic</th>
<th>átom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tom</td>
<td>atomic</td>
<td>átom</td>
</tr>
<tr>
<td>tea</td>
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The choice of allophone is determined by the syllabic position of the consonant.
Tapping/flapping:

- the replacement of /t d/ by the alveolar tap/flap [ɾ] in certain dialects of English, e.g., General American:

<table>
<thead>
<tr>
<th>Word</th>
<th>Allophone 1</th>
<th>Allophone 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tom</td>
<td>atómic</td>
<td>átom</td>
</tr>
<tr>
<td>tea</td>
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The choice of allophone is determined by the syllabic position of the consonant.

<table>
<thead>
<tr>
<th>Syllabic position</th>
<th>Pronunciation</th>
</tr>
</thead>
<tbody>
<tr>
<td>initial</td>
<td>strongly aspirated</td>
</tr>
<tr>
<td>ambisyllabic</td>
<td>weakly aspirated or tapped</td>
</tr>
<tr>
<td>final</td>
<td>unaspirated glottalized</td>
</tr>
</tbody>
</table>
Tapping/flapping:

- the replacement of /t d/ by the alveolar tap/flap [ɾ] in certain dialects of English, e.g., General American:

<table>
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<tr>
<th>Word</th>
<th>Alveolar Replacement</th>
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<tbody>
<tr>
<td>Tom</td>
<td>átom</td>
</tr>
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<td>potáto</td>
</tr>
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What happens in connected speech?
Tapping/flapping:

- the replacement of /t d/ by the alveolar tap/flap [ɾ] in certain dialects of English, e.g., General American:
  - Tom atómic átom
  - tea eightéen prétty/vánity
  - tomato potáto tomáto/potáto

- across words:
  - hit hit Aníta hit Ánn
  - get get alónɡ get úp

  a tease vs. at ease
  my tie vs. might I
Tapping/flapping:

- the replacement of /t d/ by the alveolar tap/flap [ɾ] in certain dialects of English, e.g., General American:

  Tom    atómic    átom
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  tomato potáto  tomáto/potáto

- across words:

  hit    hit Aníta    hit Ánn
  get    get alóng    get úp

  a tease vs. at ease
  my tie vs. might I

  Cross-word ambisyllabicity.
Cross-word ambisyllabicity

Giegerich (1992:280)
Other connected speech processes:
Other connected speech processes:

- assimilation processes (place assim., Fricative Devoicing, cross-word palatalization)

regressive **place assimilations**, e.g.:
- dentalisation of /t d n l/ when followed by /θ/: e.g. *quite thick*
- labial assimilation of /t d/: *hot pudding* [-p p-], *Hyde Park* [-b p-]
- velar assimilation of /t d/: *that car* [-k k-], *bad composition* [-g k-]
- nasal place assimilation: *green peas, raincoat, ink, hunger*
Other connected speech processes:

- assimilation processes (place assim., Fricative Devoicing, cross-word palatalization)

Fricative Devoicing:

```
have turned
cause to die
breathe slowly
garage to let
hæf tənd
tə dai
breiθ 'sləuli:
'ɡærə də let
```
Other connected speech processes:

- assimilation processes (place assim., Fricative Devoicing, cross-word palatalization)
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- assimilation processes (place assim., Fricative Devoicing, cross-word palatalization)
- consonant deletion, esp. h-dropping of function words
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- suprasegmental features: phrasal stress, compound stress, stress-timed rhythm, vowel reduction
Other connected speech processes:

- assimilation processes (place assim., Fricative Devoicing, cross-word palatalization)
- consonant deletion, esp. h-dropping of function words
- suprasegmental features: phrasal stress, compound stress, stress-timed rhythm, vowel reduction
- strong and weak forms of function words:
<table>
<thead>
<tr>
<th></th>
<th>Word</th>
<th>Strong form</th>
<th>Examples</th>
<th>Weak form(s)</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>the</td>
<td>ðiː</td>
<td>It's not &quot;a&quot; cat, it's &quot;the&quot; cat!</td>
<td>ðə, ðɪ</td>
<td>the /ðə/ dog, the /ðɪ/ end</td>
</tr>
<tr>
<td>2.</td>
<td>a, an</td>
<td>ei, æn</td>
<td></td>
<td>æ, (æ)n</td>
<td>a dog, an end</td>
</tr>
<tr>
<td>3.</td>
<td>some⁵</td>
<td>səm</td>
<td>I'll get you some.</td>
<td>s(æ)m</td>
<td>I'll get you some apples.</td>
</tr>
<tr>
<td>4.</td>
<td>his⁶</td>
<td>hɪz</td>
<td>It's his car; not mine.</td>
<td>(h)ɪz</td>
<td>what's-his-name</td>
</tr>
<tr>
<td>5.</td>
<td>your = you're</td>
<td>jəː(r), jʊə(r)</td>
<td>Is this YOUR CV?</td>
<td>jə(r)</td>
<td>Mind your head!</td>
</tr>
<tr>
<td>6.</td>
<td>(s)he, we, you</td>
<td>hɪː, fɪː, wiː, jʊː</td>
<td>All I want is YOU.</td>
<td>(h)ɪ, fɪ, wi jʊ (GA also jə)</td>
<td>I'll get you some apples. I gotcha!</td>
</tr>
<tr>
<td>7.</td>
<td>him</td>
<td>hɪm</td>
<td>Whom do you love: him or her?</td>
<td>(h)ɪm</td>
<td>I love him.</td>
</tr>
<tr>
<td>8.</td>
<td>her</td>
<td>həː(r)</td>
<td></td>
<td>(h)ə(r), ə(r)</td>
<td>I love her.</td>
</tr>
<tr>
<td>9.</td>
<td>their</td>
<td>ðəə(r)</td>
<td>It wasn't US, it was THEM.</td>
<td>ð(æ)m</td>
<td>Do you hate them?</td>
</tr>
<tr>
<td>10.</td>
<td>them</td>
<td>ðəm</td>
<td></td>
<td>ð(æ)m</td>
<td>one of us is crying</td>
</tr>
<tr>
<td>11.</td>
<td>there⁸</td>
<td>ðəə(r)</td>
<td>There you are!</td>
<td>ðə(ə)r (GA also ðr)</td>
<td>There's a book on the table.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>What's he getting at?</td>
<td></td>
<td>Look at me.</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>----------------------</td>
<td>---</td>
<td>-------------</td>
</tr>
<tr>
<td>12.</td>
<td>at</td>
<td>æt</td>
<td>It's just what I long for.</td>
<td>ær, fr, f⁹</td>
<td>Stay for a week.</td>
</tr>
<tr>
<td>13.</td>
<td>for</td>
<td>fə(r)</td>
<td>Where are you from?</td>
<td>frəm</td>
<td>He's from Barcelona.</td>
</tr>
<tr>
<td>14.</td>
<td>from (GA frəm)</td>
<td>from</td>
<td>It's love I've a lot of.</td>
<td>æv¹⁰</td>
<td>one of us to /tə/ me, to /tu/ Ann</td>
</tr>
<tr>
<td>15.</td>
<td>of to¹¹</td>
<td>ðæv (GA ðav) tuː</td>
<td>Who did you give it to?</td>
<td>tə, tu</td>
<td>even better than the real thing</td>
</tr>
<tr>
<td>16.</td>
<td>than¹²</td>
<td>ðæn</td>
<td>&quot;Than&quot; is spelt with an &quot;a&quot; not an &quot;e&quot;.</td>
<td>ð(ə)n</td>
<td>Twist and shout!</td>
</tr>
<tr>
<td>17.</td>
<td>and</td>
<td>ænd</td>
<td>&quot;And&quot; is a conjunction.</td>
<td>(ə)n(d)¹³</td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>but</td>
<td>hæt</td>
<td>Don't say &quot;but&quot;!</td>
<td>hæt</td>
<td>sad but true</td>
</tr>
<tr>
<td>19.</td>
<td>that¹⁴</td>
<td>ðæt</td>
<td>What's that?</td>
<td>ðæt</td>
<td>the book that we bought</td>
</tr>
<tr>
<td>20.</td>
<td>or</td>
<td>œ:(r)</td>
<td>To be or not to be?</td>
<td>œ(r)¹⁵</td>
<td>sooner or later</td>
</tr>
<tr>
<td>21.</td>
<td>as</td>
<td>æz</td>
<td>as and when</td>
<td>æz</td>
<td>as good as it gets</td>
</tr>
<tr>
<td>22.</td>
<td>have has had</td>
<td>hæv hæz hæd</td>
<td>Have you seen her? Had I known him earlier...!</td>
<td>(h)æv, v (h)æz, z, s (h)æd, d</td>
<td>You've got to know. She's got it. It's been a year. You'd better stop!</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>24.</td>
<td><em>can</em></td>
<td><em>kæn</em></td>
<td><em>Can you dance? Yes, you could.</em></td>
<td><em>k(ə)n</em></td>
<td><em>I can see. You could be mine.</em></td>
</tr>
<tr>
<td>25.</td>
<td><em>will</em></td>
<td><em>wɪl</em></td>
<td><em>Will Susan be there? Would you like it?</em></td>
<td><em>(w)əl</em></td>
<td><em>Susan will be at home. I'd rather sail away.</em></td>
</tr>
<tr>
<td>26.</td>
<td><em>shall</em></td>
<td><em>ʃæl</em></td>
<td><em>Shall I open the window?</em></td>
<td><em>(ʃ)əl</em></td>
<td><em>I think you should work harder.</em></td>
</tr>
<tr>
<td>27.</td>
<td><em>must</em></td>
<td><em>mʌst</em></td>
<td><em>You MUST hold on!</em></td>
<td><em>(mʌs(t)</em></td>
<td><em>I must go now.</em></td>
</tr>
<tr>
<td>28.</td>
<td><em>do</em></td>
<td><em>duː</em></td>
<td><em>How do you do? Yes, she does!</em></td>
<td><em>(duː, d(ə)</em></td>
<td><em>How do you do? What does he do?</em></td>
</tr>
<tr>
<td>29.</td>
<td><em>am, are</em></td>
<td><em>(æm, aː(r)</em></td>
<td><em>I AM hungry! He said he wasn't sleepy but he was!</em></td>
<td><em>(æ)m, æ(r)</em></td>
<td><em>I'm hungry. They were all drinking in the pub.</em></td>
</tr>
<tr>
<td>30.</td>
<td><em>been</em></td>
<td><em>bɪːn</em></td>
<td><em>Where have you been?</em></td>
<td><em>(bɪn</em></td>
<td><em>I've been busy all day.</em></td>
</tr>
<tr>
<td>+1.</td>
<td><em>Saint</em></td>
<td><em>sɛnt</em></td>
<td><em>He's a saint.</em></td>
<td><em>(s(ə)n(t)</em></td>
<td><em>Saint Paul's Cathedral</em></td>
</tr>
</tbody>
</table>
(schwa-exercise)
The internal structure of segments (melody)
Are speech sounds atomic?
the "atomic hypothesis"
but:
- processes affecting part of sound segments only: e.g.:
  nasal place assimilation: place of articulation affected only
    obstruent devoicing: voicing affected only
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- processes affecting part of sound segments only: e.g.:
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- parts of sound segments revealing themselves: e.g.:
  (a) plosive insertion: prince -> prin(t)s
     /n/ >> /s/
     voiced voiceless
     nasal oral
     stop fricative
     alveolar alveolar
  (b) vowel nasalisation: nasality spreading from consonant onto vowel
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    nasal oral
    stop fricative
    alveolar alveolar
  (b) vowel nasalisation: nasality spreading from consonant onto vowel
- sound segments decomposing: lenition, e.g.:
  /t/ > /s/ > /h/ > zero
    voiceless voiceless voiceless
    alveolar alveolar
    stop
/t/ > /D/
voiceless alveolar stop
alveolar

/t/ > /ʔ/
voiceless stop
alveolar stop
/t/  >  /D/
voiceless  alveolar
stop
alveolar

/t/  >  /ʔ/
voiceless  stop
alveolar
stop

- natural classes: natural class: a group of sounds that share at least one phonological feature, e.g. ‘nasals’, ‘voiceless plosives’ vs. /p l n/
phonological processes never affect random groups of sounds
one possible model: binary features, e.g.: \([\pm \text{voiced}], [\pm \text{nasal}], [\pm \text{aspirated}] \) (or: \([\pm \text{spread glottis}]\)), \([\pm \text{continuant}], [\pm \text{sonorant}], [\pm \text{high}], [\pm \text{low}]\), etc.

\([+[\text{high}}, -\text{low}], [-\text{high}, +\text{low}], [-\text{high}, -\text{low}], *[+\text{high}}, +\text{low}]\)

redundant (predictable, non-distinctive) features vs.
nonredundant, distinctive features: nasalisation of vowels, English vs. French

\([\text{voiced}]\): distinctive for English obstruents but redundant for sonorants

predictable = redundant = nondistinctive = nonphonemic

redundancy rules e.g.

\([+\text{son}] \rightarrow [+ \text{voice}]\)  “All sonorants are voiced.”
<table>
<thead>
<tr>
<th>Feature Specifications (partial)</th>
<th>p</th>
<th>b</th>
<th>m</th>
</tr>
</thead>
<tbody>
<tr>
<td>consonantal</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>labial</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>voiced</td>
<td>−</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>nasal</td>
<td>−</td>
<td>−</td>
<td>+</td>
</tr>
</tbody>
</table>
Nasal Assimilation

\[ V \rightarrow [+\text{nasal}] \times \underline{\text{_____}} \ C \]

\[ [+\text{nasal}] \]
Aspiration in English 1

\[
\begin{align*}
C \quad & \rightarrow \left[ \begin{array}{c}
-voice \\
-cont \\
-nas \\
\end{array} \right] \quad \rightarrow \left[ -sp.gl. \right] \\
\end{align*}
\]
Aspiration in English 2

\[
\begin{bmatrix}
-\text{voice} \\
-\text{cont} \\
-\text{nas}
\end{bmatrix} \rightarrow \begin{bmatrix}
+ \text{sp.gl.}
\end{bmatrix}
\]
Kinder® CHOCOLATE

Kinder® CHOCOLATE + MILK - COCOA

8 BARS 100 g €
An alternative model
An alternative model

Binary features: +/-

Or: unary (monovalent/privative)
An alternative model

Binary features: +/-

Or: unary (monovalent/privative)

both divide sounds into two classes: [+nasal] vs. [-nasal] / [nasal] vs. zero
An alternative model

Binary features: +/-

Or: unary (monovalent/privative)

both divide sounds into two classes: [+nasal] vs. [-nasal] / [nasal] vs. zero

but: binary features imply that the classes should behave symmetrically
An alternative model

Binary features: +/-

Or: unary (monovalent/privative)

both divide sounds into two classes: [+nasal] vs. [-nasal] / [nasal] vs. zero

but: binary features imply that the classes should behave symmetrically

this is not true
An alternative model

the classes do not behave symmetrically
An alternative model

the classes do not behave symmetrically:
- markedness
- phonological activity
An alternative model

the classes do not behave symmetrically:
- markedness
- phonological activity

these observations support a unary model
An alternative model

the classes do not behave symmetrically:
- markedness
- phonological activity

these observations support a unary model

+ theoretical gain: a privative model of phonological oppositions is more constrained
An example of unary models:
Element Theory
An example of unary models: Element Theory

Unary primes: elements
An example of unary models: Element Theory

Unary primes: elements
like chemical elements or colours
An example of unary models: Element Theory

Unary primes: elements

like chemical elements or colours:
  independent interpretation + compounds
Elements for vowels

<table>
<thead>
<tr>
<th>Element</th>
<th>Independent interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>a</td>
</tr>
<tr>
<td>I</td>
<td>i</td>
</tr>
<tr>
<td>U</td>
<td>u</td>
</tr>
</tbody>
</table>
Elements for vowels

Simplex

\[
\begin{align*}
\text{a} & : [A] \\
\text{i} & : [I] \\
\text{u} & : [U]
\end{align*}
\]

Compound

\[
\begin{align*}
\text{e} & : [A, I] \\
\text{o} & : [A, U] \\
\text{ü} & : [U, I]
\end{align*}
\]
Elements for vowels

<table>
<thead>
<tr>
<th>BACK</th>
<th>I</th>
<th>I</th>
<th>I</th>
<th>I</th>
<th>I</th>
<th>V</th>
<th>V</th>
<th>V</th>
<th>V</th>
<th>V</th>
<th>V</th>
<th>V</th>
<th>V</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
<td>I</td>
</tr>
<tr>
<td>HIGH</td>
<td>V</td>
<td>V</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td>ROUND</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
<td>U</td>
</tr>
<tr>
<td>ATR¹²</td>
<td>+</td>
<td>V</td>
<td>+</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td>i</td>
<td>e</td>
<td>æ</td>
<td>ø</td>
<td>ø</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>o</td>
<td>u</td>
</tr>
</tbody>
</table>
Elements for vowels

(a) $i:V \rightarrow i:yV$

(b) $u:V \rightarrow u:wV$

spreading
Elements for vowels

pay as

spreading
Elements for vowels

O  N  O  N  O  N  N
I / \ / I I I I
x x x x x x x x going
I \ / / I I I I
g U>>>>> i n
A
I
V
I
T
Elements for vowels

\[
\begin{array}{cccccccc}
O & N & O & N & O & N & N & N \\
/ & \_ & \_ & \_ & \_ & \_ & \_ & \_ \\
\times & \times & \times & \times & \times & \times & \times & \times \\
\_ & \_ & \_ & \_ & \_ & \_ & \_ & \_ \\
\_ & \_ & \_ & \_ & \_ & \_ & \_ & \_ \\
\_ & \_ & \_ & \_ & \_ & \_ & \_ & \_ \\
\_ & \_ & \_ & \_ & \_ & \_ & \_ & \_ \\
\_ & \_ & \_ & \_ & \_ & \_ & \_ & \_ \\
\end{array}
\]

\[shah\ of\]
Elements for vowels

(a) $ay > \varepsilon$

\[
\begin{array}{c}
N \\
/ \ \ / \\
x \ x \ x > x \ x \\
| \\
[I] \\
[A]
\end{array}
\]

(b) $aw > \circ$

\[
\begin{array}{c}
N \\
/ \ \ / \\
x \ x \ x > x \ x \\
| \\
[U] \\
[A]
\end{array}
\]

composition = fusion
Elements for vowels

(a) eː > ey

(b) oː > ow

decomposition = fission
Elements for vowels

(a) Raising
   \[ \begin{array}{c}
   o > u \\
   N |
   x > x \\
   A |
   U \\
   \end{array} \]

(b) Lowering
   \[ \begin{array}{c}
   o > a \\
   N |
   x > x \\
   A |
   U \\
   \end{array} \]

(c) Centralization
   \[ \begin{array}{c}
   o > \varepsilon \\
   N |
   x > x \\
   A |
   U \\
   \end{array} \]
Elements for consonants
Elements for consonants

the "one-mouth" principle
A, I, U
complexity
+ recall: lenition
## Elements for consonants

<table>
<thead>
<tr>
<th></th>
<th>Pre-deletion target</th>
<th>Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glottalling</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>‘Aspiration’</td>
<td>h</td>
<td>h</td>
</tr>
<tr>
<td>Vocalization</td>
<td>r</td>
<td>R</td>
</tr>
<tr>
<td></td>
<td>y</td>
<td>I</td>
</tr>
<tr>
<td></td>
<td>w</td>
<td>U</td>
</tr>
<tr>
<td></td>
<td>γ</td>
<td>@</td>
</tr>
</tbody>
</table>
Elements for consonants

(a) t > (b) s > (c) h > (d) Ø

x | x | x | (x)

h | h | h

R | R

?
Phonology – morphology interface in English
éducate – éducating – éducation
adápt – adápted – àadaptation
diagnose – diagnoses – díagnóstic
journál – journálist – journálese
ártsunn – ártumn-like – ártumnal
(a) inexusable, ineligible, inoperative
(b) inflammable, intrepid, insouciant
(c) impossible, implicit, imbued
(d) illegal, irregular, irresponsible
(e) innocuous, immaterial, immature
unnerved, unnecessary, unnatural
English morphology
(a) Root-level morphology:
   Affixation: \(<\text{in-}, \text{-ity}, \text{-ic}, \text{-al}, \text{-ory}, \text{-ate}, \text{-ion}, \text{-ant}, \text{-th}, \ldots>\>
   ‘Strong’ verbs/nouns: \(<\text{blew, brought, sang, feet, mice}, \ldots>\>

(b) Word-level morphology:
   Affixation: \(<\text{un-}, \text{-ed}, -(e)s, \text{-ing}, \text{-ness}, \text{-ly}, \text{-ful}, \text{-ship}, \text{-hood}, \text{-ment}, \ldots>\>
   Compounds, e.g. \(<\text{cart horse, seagull, blackboard}, \ldots>\>
(a) nation-al-ity
(b) nation-al-s
(c) nation-hood-s
(d) *nation-hood-al, *nation-s-ity
(a) Degemination
i[n]-effectual
i[m]-probable

(b) Closed-syllable shortening
Long VVC
perceive
describe
reduce
thieve

Short VCC
perceptive
descriptive
reduction
theft
(a) Velar Softening
   electri[k]       electri[s]-ity
   criti[k]        criti[s]-ism
   mysti[k]        mysti[s]-ism

(b) Spirantization
   pirate           pira[s]-y
   president        presiden[s]-y
   permit           permis-ive
   conclude         conclus-ive
   corrode          corros-ive
   deride           deris-ive

(c) Vowel Shift and Trisyllabic Laxing
   veyn  vain       væniti  van-ity
   særin  serene    særæniti  seren-ity
   divayn  divine   drviniti  divin-ity
(a) panic-ing  *panic[s]-ing
(b) flight[t]-y  *flight[s]-y
(c) might-i-ly  *might-i-ly
teeter-ing     *t[ε]ter-ing
<table>
<thead>
<tr>
<th></th>
<th>Compound</th>
<th>Phrase/sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td>$p-m$</td>
<td>lap marker</td>
<td>stop me</td>
</tr>
<tr>
<td>$v-t$</td>
<td>dove tail</td>
<td>live to</td>
</tr>
<tr>
<td>$\theta-b$</td>
<td>moth ball</td>
<td>path belongs</td>
</tr>
</tbody>
</table>
(a) \( nn \)  keen-ness, brown-ness
(b) \( ll \)  cool-ly, tail-less
   \( ff \)  trough-ful
(c) night time, sack cloth, tail light
(d) good day, take care, pass slowly
(a) Word-affix

\[\begin{array}{l}
 t-h \\
 f-n \\
 m-l \\
\end{array}\]

\[\begin{array}{l}
 \text{parent-hood} \\
 \text{stiff-ness} \\
 \text{harm-less} \\
\end{array}\]

(b) Cross-word

\[\begin{array}{l}
 \text{parent who} \\
 \text{if none} \\
 \text{come late} \\
\end{array}\]
<table>
<thead>
<tr>
<th>(i)</th>
<th>Root-affix</th>
<th>(ii)</th>
<th>Word-final</th>
<th>(iii)</th>
<th>Word-affix</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td>$gn$</td>
<td>si$gn$ature</td>
<td>sign</td>
<td>signing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>resi$gn$ation</td>
<td>resign</td>
<td>resigning</td>
<td></td>
</tr>
<tr>
<td>(b)</td>
<td>$mn$</td>
<td>da$mn$ation</td>
<td>dam$\emptyset$</td>
<td>dam$\emptyset$ing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>conde$mn$ation</td>
<td>condem$\emptyset$</td>
<td>condem$\emptyset$ing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>hy$mn$al</td>
<td>hym$\emptyset$</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(c)</td>
<td>$mb$</td>
<td>bo$mb$ard</td>
<td>bomb$\emptyset$</td>
<td>bomber</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>cru$mb$le</td>
<td>crumb$\emptyset$</td>
<td>crumb$\emptyset$y</td>
<td></td>
</tr>
</tbody>
</table>
(a) fi[ng]er, a[ng]er
(b) *fi[ŋ]er, *a[ŋ]er
(c) lo[ŋ]-er, stro[ŋ]-er
   (*lo[ŋ]-er, *stro[ŋ]-er)
(d) si[ŋ]-er, ba[ŋ]-er
(e) lo[ŋ]g, stro[ŋ]g, si[ŋ]g