Phonetic Voicing in Oneida Plosives

Tsan Huang
thuang3@buffalo.edu

&

Karin Michelson
kmich@buffalo.edu

Department of Linguistics
SUNY at Buffalo
Background (1)

VOT constraints on plosive voicing (Keating 1984)

(1) **voiced** vs. **voiceless unaspirated** (as in French; e.g. Baker 1929)

(2) **voiceless unaspirated** vs. **voiceless aspirated** (as in Mandarin; e.g. Chao 1968)

One may also add:

*voiced vs. voiceless unaspirated vs. voiceless aspirated* (as in Thai; e.g. Abramson & Lisker, 1964)
Background (2)

Previous perceptual studies show that these categories correspond to lead, short lag and long lag VOT (e.g. Lisker & Abramson 1970).

| voiced | voiceless unasp. | voiceless asp. |

In production, languages with a voicing contrast usually allow very little overlap among the VOT values across different voicing categories (Keating 1984).
Background (3)

- Oneida sound inventory: (Lounsbury [1953] 1976; Michelson 1988)
  - **Vowels:** /a, e, i, o, u, v*/
  - **Consonants:** /t, k, s, h, ?, n, l, w, y/
  - No voicing contrast
    */v/ = caret

- Prediction: The Oneida plosives should be free to employ the whole VOT scale.
Positional phonetic variants reported in traditional analyses (Lounsbury [1953] 1976)

[D,G] lenis voiceless  \( \{C,\#\}_\{V,R\} \)

[d, g] lenis voiced  \( \{V,\# ,?\}_\{V,R\} \)

[t] fortis voiceless released  \_\{k, s, h\} \)

[k] fortis voiceless released  \_\{t, j*, s, h\} \)

[t\(^-\)] fortis voiceless unreleased  \_\{t, j\} \)

[k\(^-\)] fortis voiceless unreleased  \_k \)

* /j/ = palato-alveolar affricate
Goal of current study

- Pinpoint the phonetic properties of /t, k/
  - How voiced are the ‘lenis voiced’?
  - How aspirated are the ‘fortis voiceless released’?

- Provide instrumental data
Methodology (1)

- Recordings of two speakers so far

- Recording list: 500 or so everyday expressions or numerals (Doxtator, nd.)

- Praat scripts for tagging and taking measurements
Methodology (2)

Measurements taken:
- Voicing during closure (VDC)
- Closure duration (CD)
- Lag voice onset time (lag VOT)

* Percentage of closure voicing VDC:CD ratio
* Correlation between VDC:CD and lag VOT
An **intervocalic voiced /k/** (lag VOT = 20ms)

/ n e k v /

Voicing During Closure (VDC)

Lag VOT

Closure Duration (CD)
A medial plosive following a non-identical obstruent (lag VOT = 25ms)

Voicing During Closure (VDC)

Lag VOT

Closure Duration (CD)
An **utterance-initial voiceless unaspirated** /t/ (lag VOT = 10ms).
An **utterance-final voiceless unaspirated** /k/ following a non-identical obstruent (lag VOT = 195ms).
VDC x lag VOT plot for /k/
VDC x lag VOT plot for /t/
Some allophones

Voiceless unaspirated
  obs.(#)_V, Vh_V; ##_V

Voiced
  V{#, ?}_V{R}

Partially voiced moderately aspirated
  V(#)_obs., Vk#n, Vtl

(Partially voiced) aspirated
  V{#, h}_V

Voiceless strongly aspirated
  ##

Lenis voiceless
  {C,#}_V{R}

Lenis voiced
  {V,#, ?}_V{R}

Fortis voiceless released
  {k/t, j, s, h}
Word-initial /k/ preceded by a glottal stop /ʔ/: partially voiced

[s e g a s e g v]
Some allophones

Voiceless unaspirated
  ##_V, obs.(#)_V, Vh_V
Voiced
  V{#, ?}_{V,R}
Partially voiced moderately aspirated
  V(#)_obs., Vk#n, Vtl - example
(Partially voiced) aspirated
  V_{#,h} V
Voiceless strongly aspirated
  ###

Lenis voiceless
  {C, #}_{V,R}
Lenis voiced
  {V, #, ?}_{V,R}

Fortis voiceless released
  _{k/t,j, s, h}
Word-final /k/ followed by a word-initial /n/: schwa insertion

Voicing During Closure (VDC)

Lag VOT

Closure Duration (CD)
Some allophones

<table>
<thead>
<tr>
<th>Voiceless unaspirated</th>
<th>Lenis voiceless</th>
</tr>
</thead>
<tbody>
<tr>
<td># # _V, obs.(#)_V, Vh_V</td>
<td>{C, #} _{V, R}</td>
</tr>
<tr>
<td>Voiced</td>
<td>Lenis voiced</td>
</tr>
<tr>
<td>V{#, ?}_{V, R}</td>
<td>{V, #, ?}_{V, R}</td>
</tr>
<tr>
<td>Partially voiced moderately aspirated</td>
<td>Fortis voiceless released</td>
</tr>
<tr>
<td>V(#)_obs., Vk#n, Vtl</td>
<td>_{k/t, j, s, h}</td>
</tr>
<tr>
<td>(Partially voiced) aspirated</td>
<td></td>
</tr>
<tr>
<td>V_{#, h} V</td>
<td></td>
</tr>
<tr>
<td>Voiceless strongly aspirated</td>
<td></td>
</tr>
<tr>
<td>_##</td>
<td></td>
</tr>
</tbody>
</table>
Word-final /k/: aspirated

[kw a h o kʰ oː n ]

- Voicing During Closure (VDC)
- Lag VOT
- Closure Duration (CD)
Word-medial /k/ followed by /h/
Goal of current study

- Pinpoint the phonetic properties of /t, k/
  - How voiced are the ‘lenis voiced’? - over 80%
  - How aspirated are the ‘fortis voiceless released’? – It depends.

- Provide instrumental data
General patterns (1)

- /t/ is more likely to be voiced. In Mercy D.’s data, 8/53 utterance-initial voiced /t/s (VDC:CD = 90%), only 1/43 voiced /k/
  Norma J.: no voiced tokens for either plosive

- **Word-medial plosives** in the coda position and flanked by voiced segments are more likely to be voiced.
Utterance-initial /t/: almost fully voiced (lag VOT = 10msec); Intervocalic /k/: fully voiced (including the release burst)
General patterns (2)

- The longer the lag VOT, the less voiced the plosive.

Plosives after long vowels (esp. true for Mercy D.) may not be voiced, as the long vowel may devoice toward the end.

/i, j/ induce longer lag VOTs
Word-initial /k/ followed by the glide /j/ (lag VOT = 35msec)

[ s e g u g j a h s ]

Voicing During Closure (VDC)
Lag VOT
Closure Duration (CD)
Ending thoughts

Our instrumental data show that the early description by Lounsbury ([1953] 1976) is accurate.

But our data provide a more detailed picture of the phonetics of Oneida plosives.

The data also confirm our prediction that if there is no voicing contrast, the whole VOT scale can be used for phonetic implementation of plosive voicing - as opposed to cases involving a two-way contrast where distributions of the two categories have to be restricted within their respective range as discussed by Keating (1984).
Ongoing research

- Record and analyze more speakers’ speech.
- Add more words and phrases to the recording list to include all possible environments and to achieve equal weight for different environments if possible.
References


Doxtator, M. (nd.) *Eleven Lessons in Oneida*.


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