Toward a Typology of Intonation Unit Cues

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Introduction

Intonation Unit (IU)
- a discourse-level linguistic unit
- defined by prosodic rather than syntactic or semantic characteristics
- analytical tool for studying discourse: allows study of correlation of prosodic structure with other grammatical structures (e.g. Chafe 1979, Du Bois 2001, Ford et al. 2002, Shenk 2006)

Locating IUs in the speech stream
- Du Bois (e.g. 2006) provides a series of prosodic cues for identifying IUs in American English (AmE)
- based on the cues for AmE, IUs have been described in other languages: e.g. Korean (Kim 1996, Park 2002), German (Schuetz-Coburn 1994), Japanese (Matsumoto 2000), Mandarin (Iwasaki & Tao 1993), Dolahk'æ Newar (Genetti & Slater 2004), Ahtna (Berez to appear), Wardaman (Croft 2007)
- as of yet, there is no crosslinguistic typology of intonation units

Objectives

IU cues in three unrelated languages
- compare prosodic IU cues in three languages – American English, Ahtna, and Sm'algyax

Our hypothesis
- Du Bois's (2006) prosodic IU cues are universal (that is, all languages exhibit each of the cues to varying degrees)
- languages vary as to how valid any particular IU cue is in indicating an IU boundary, where validity is defined in terms of the frequency of the IU cue and the degree of impact of confounds on it
- high validity – strong indicator of an IU boundary – presence of a single high validity cue is often sufficient to identify an IU boundary
- mid validity – fair indicator of an IU boundary, especially when it occurs together with other cues
- low validity – weak indicator of IU boundaries that may contribute to the identification of a boundary only when it co-occurs with other cues
- In particular, languages vary as to
  - which language features and contexts may act as confounds to obscure the validity of an IU cue
  - how frequent any particular IU cue is, and thus how valid the IU cue is
- which IU cues tend to cluster together, strongly asserting the presence of an IU boundary, thus asserting as prototypical IU cues for the language

Data

American English
- 611 IUs of a public storytelling event (T=19:22) recorded after a church potluck in Chicago
- the speaker, a professional storyteller in her mid forties, tells several stories and interacts with the audience
  
Ahtna (an Athabascan language of south central Alaska)
- 148 IUs of spontaneous monologue (T=06:18) by Martha Jackson, recorded in 1982 in Fairbanks with linguist James Kari.
- topic is an unrehearsed recitation of a traditional narrative and an explication of tribal practices

Sm'algyax (Coast Tsimshian, a Tsimshianic language of NW coast of British Columbia & Alaska)
- 115 IUs of an oral performance (T=05:15) by Dorothy Brown, recorded in 1968 in Kitkata, BC with linguist John Dunn
- Sabaan, a traditional adaxw ‘legend’, describes the first meeting between the Coast Tsimshian and the crew from a European sailing ship
IU Cues – A Sample from Ahtna

Lag (and rush) – a function of relative duration of syllables
- Figure 1: bird’s-eye view of raw syllable duration
  - each panel shows all IU’s of a particular length in syllables
  - x-axes show linear position of syllable in IU
  - y-axes show syllable duration in ms
  - nonparametric smoothers show increased duration at the ends of IUs
- However, syllable duration is multifactorial. Independent variables include
  - nuclear vowel length (long vs. short vs. reduced)
  - morpheme type (stems vs. prefixes vs. other)
  - genre
- ANOVA confirms the Ahtna data exhibit lag as an IU boundary cue (adjusted R²=0.04005; F=27.05; df=22; df=386; p<0.001)
- Lag is a high-validity cue in Ahtna: it is highly frequent and rarely impacted by potential confounds

Pitch reset – a pitch excursion between two adjacent syllables that sounds larger than the series of excursions between pairs of adjacent syllables
- Figure 2: adjacent-syllable average F0 transitions in chronological order (not F0 values)
- Plotted points are the positive or negative difference in pitch between syllables
- Darkened points are the 5% most extreme transition and vertical lines represent posited IU boundaries
- Significant majority (χ²=12.23; df=1; p<0.001) of extreme transitions occur within 1 syllable of an IU boundary
- This confirms the Ahtna data exhibit pitch reset as an IU boundary cue
- Pitch reset is a high-validity cue in Ahtna: it is highly frequent and rarely impacted by potential confounds

Register – changes in amplitude can contribute to the identification of an IU boundary
- In this example, register change, lag, and continuing boundary tone together assert the presence of an IU boundary
- Register is a low-validity cue in Ahtna: it is uncommon, and is susceptible to potential confounds

IU Cues – A Sample from Sm’algyax

Isotony – parallelism of intonation contours across IUs can contribute to the identification of an IU boundary
- Lines 23 & 24: same tune, but different boundary tones
  \[ \sigma \sigma \sigma \sigma \sigma \sigma \sigma \sigma \sigma \]
- Figure 3: pitch (blue) and intensity (green) contours indicate parallel intonation contours

Lag – high-validity cue in Sm’algyax
- highly frequent – marked by [ ] in final stem syllable in lines 1, 2, 5 & 7
- confounds include phonemic long Vs and primary & booster accents – low chance of misinterpretation

Pause and Inhalation – high-validity
- highly frequent
- confounds uncommon or readily identifiable

Creak – low-validity
- relatively frequent
- confounds include phonemic glottalised V and use as a prominence marker (e.g. line 8) – high chance of misinterpretation

Accent Count/Location – low-validity
- confounds include frequent occurrence of ≥ 2 primary and/or ≥ 1 booster accents per IU, with accents in range of locations (e.g. lines 1, 2, 6 & 7)

Table 4: summary of strength of IU cues in indicating an IU boundary

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<thead>
<tr>
<th>IU Cue</th>
<th>high validity</th>
<th>mid validity</th>
<th>low validity</th>
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<tbody>
<tr>
<td>lag</td>
<td>strong indicator</td>
<td>fair indicator</td>
<td>weak indicator</td>
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<td>rush</td>
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<td>boundary tone</td>
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<td>pitch reset</td>
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<td>pause</td>
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<td>register</td>
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Conclusion – Toward a Typology of IU Cues

- our findings suggest that there is a set of prosodic IU cues that is universal, in that all languages exhibit each of the cues to varying degrees, but that languages vary according to how valid any particular cue is in indicating the presence of an intonation unit boundary
- the approach we have taken here can be operationalized as a methodology for determining the prosodic IU cues for a particular language
- we propose that this methodology can be used to test our predictions across languages

Selected References