

**6.542J, 24.966J, HST.712J LABORATORY ON THE PHYSIOLOGY,
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Possible Prosody Projects

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Possible Projects in Prosody

- 1) What representation guides the computation of syllable and segment duration in reiterant speech?

A number of different factors influence durations in spoken utterances (Klatt 1976), including the intrinsic duration of a segment (e.g. tense vowels are longer than lax vowels), segmental context (such as the voicing value of a post-vocalic consonant) and phrasal prosodic context (as in preboundary lengthening). A critical question for modelling this variation is whether prosodic constraints are represented separately from segmental constraints (both intrinsic and contextual) on duration. Using a behavioral tool called reiterant speech, in which a speaker imitates an utterance using repetitions of a single syllable like /ma/, we can find out whether the imitated utterance shows durational effects of the original tense/lax or voiced-voiceless distinction, or just the prosodic boundary effects on duration. Results will tell us whether speakers construct a prosodic representation that determines durations at boundaries independent of the segmental content of the utterance.

A script has been generated for eliciting speech with tense and lax vowels before voiced vs. voiceless consonants in preboundary vs. non-boundary position, and some recordings are available for analysis; additional utterances will need to be recorded, digitized and analysed.

- 2) What constituents exhibit polysyllabic shortening?

Lehiste (1976) has shown that when additional syllables are added to a monosyllabic root, as in *stick, sticky, stickiness*, the first syllable shortens in duration. This finding suggests that speakers may adjust durations to tend toward a consistent word duration, although this goal is not fully attained. Is this effect limited to within-word syllables, or does it also occur when syllables or words are added to a phrase, as in *bake apples vs bake us an apple?*

Several scripts have been generated, and some utterances are available for analysis.

- 3) We know that irregular pitch periods are likely to occur at the onset of a vowel-initial word when it is at the beginning of an Intonational Phrase. Does this also occur at smaller constituent boundaries?

Pierrehumbert and Talkin (1992) showed that this variation in voice source tends to occur at the onset of a full intonational phrase, and Dilley et al. (1996) showed that it occurs at the onset of an intermediate intonational phrase as well, at least for full vowels. Does this occur at the onset of smaller constituents?

A number of recordings for 6 speakers are available for analysis, to compare e.g. *bake apples* and *bake an apple*, where a constituent boundary might be expected between the verb and the noun phrase, with *bake us apples* and *bake him apples*, where the pronoun might form a clitic group with the verb.

4) Is the onset f_0 of an utterance affected by the nature of the first pitch accent?

Yi Xu's (1990's) work on Mandarin tones showed that certain lexical tones are realized with a lower f_0 before a word with a following high tone and higher f_0 before a following low tone, as if to emphasize the contrast between them. Do English speakers do something similar with their onset f_0 , so that onset f_0 before an initial L^* is higher (to highlight the L) and f_0 before a H^* is lower (to highlight the H)?

Utterances from two speakers have been recorded and digitized; results show that one speaker contrastively changes onset f_0 while the other speaker actually changes onset f_0 to match the level of the first pitch accent more closely. Several more subjects need to be recorded, digitized and measured.

5) Where does a stop become a fricated consonant?

A stop consonant like /k/ is sometimes produced without a measurable period of closure and a release, but instead with a period of relatively constant frication. In what circumstance is this 'weakening' most likely to occur?

Recordings of 9 /k/-final verbs in various prosodic contexts have been made for 6 speakers, and some of the utterances have been labeled for 'fricativization' of the /k/. Additional digitizing and labeling will provide more data.

6) Does the number of syllables or words in a sentence affect its prosodic phrasing?

Work by Gee and Grosjean (1982) showed that on some tasks, when speakers produce 2-phrase utterances they prefer to place the intonational phrase boundary near the middle (as calculated in terms of words or syllables) even when this location does not correspond to the major syntactic boundary, as in "He gave the report to a room full of people." Does the number of words and syllables in a sentence influence the number of intonational phrases that the speaker decides to use, even when the syntax of the sentences is similar?

A script has been written and 4 speakers have been recorded; the utterances need to be labelled for intonational phrase boundary locations and analysed for the potential influence of number of words vs. number of syllables on boundary locations.