**6.542J, 24.966J, HST.712J LABORATORY ON THE PHYSIOLOGY,
ACOUSTICS, AND PERCEPTION OF SPEECH
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Acoustic correlates of prosodic structure: Part 2

Reference

Selkirk, E.O. (1984), Prosody and syntax: the relation between sound and structure. Cambridge, Mass.: MIT Press. pp. 252-265: *The phonology and phonetics of English intonation*.

Procedure

For these measurements, use the recordings your group made for the first lab; make the same measurements for the speaker of another group. Do you find similar results for the two speakers?

One of the aims of this lab is to illustrate some of the kinds of problems that investigators run into when they try to measure the acoustic parameters of a speech signal. In your lab report, discuss any problems you ran into, and possible methods for addressing these problems, if you come up with some.

A. Effects of prominence

1. Effect of lexical-level prominence

> You recorded the word *rebel* (the verb, as in *to reBEL*) and the word *rebel* (the noun, as in *the REbel*), which differ in their placement of main lexical stress. What are the acoustic differences you observe between these two forms? Consider overall duration, spectral quality and duration of the vowel (or syllable rhyme if the vowel-consonant boundary is hard to find), and the nature of the stop release noise. Can you be sure that differences you observe are due to lexical-level prominence? How could to test this hypothesis?

2. Effect of phrase-level prominence

> You recorded the word *teacher* in 6 different utterances; in 5 of them this word is the last word in the utterance:

> > *Teacher*
> > *High school teacher*

> *School teacher*
> *Tall school teacher*
> *Was he a high school teacher?*

Listen to each utterance and determine whether the word *teacher* has a phrase-level prominence (i.e. a pitch accent) or not, and compare the durations of the accented syllable *tea-* for accented and non-accented tokens. Which ones are longer? Are there spectral differences as well?

Other factors also influence syllable duration. Compare the duration of *tea-* in the utterance *Teacher* vs. the utterance *Teach*. Why might they be different?

B. Effects of phonological context on the phonetic realization of a segment

1. Effects of phrase-level prominence on stop bursts

You recorded 7 pairs of phrases like *bray CUP, BRAY cup*, which were designed to elicit pitch accents on the word in uppercase font. Listen to your utterances to see whether this manipulation was successful. Then examine the word-initial stop bursts (for the words that have them). Consider duration of the noise-filled voice onset time, and amplitude of the noise. Do they differ systematically with accent? If so, what differences do you observe?

2. Effects of position in the word on stop bursts

In the subdirectory oldprosodylab2 in the directory prosodylab2, you will find recorded utterances from 2 speakers (bc and rk) of word triads like *cup, cub, coop*, recorded 3 times in the frame sentence *Say the big word X again.* (These files also contain reiterant imitations of these utterances, which you can ignore.) For 2 of the word triads, *pig-pick-peak* and *cub-cup-coop*, consider the stop bursts for /p/ and /k/ in initial and final position.

For tokens where you can measure the bursts, how do they differ for word-initial vs. word-final contexts? What factors other than position in the word might be influencing these differences? How could you test the hypothesis that it is position in the word rather than other factors that is responsible for the differences you observe?

Why is it difficult or impossible to make this measurement in some tokens?

C. OPTIONAL: Labelling pitch accents and intonational phrase boundaries. To test your intuitions about the location of phrase-level prominences and constituent boundaries, you can label speaker f3a's paragraph in the prosodylab2 subdirectory, using a simplified system: * for pitch accent and] for intonational phrase boundary. Follow the instructions for using xwaves in the prosody lab 2 handout to bring up .tone, .break and .word labels, but BE SURE TO use a filename that is specific to your lab group (or to you, if you are labelling solo) for the tone and break label files, so that each set of labels will be saved separately. Just use a group-specific filename to bring up new blank labeling windows, yourgroup.breaks and yourgroup.tones, so you can enter your own labels by placing the cursor where you want to insert a label, and then typing in the * or [ ] from the keyboard. Closing xwaves by clicking on the QUIT button in the MSD window will automatically save these label files, so it is especially important to select a filename specific to your lab group.