Project 1
Acoustic Measures and Transcription

1. Spectrographic measures of voiceless obstruents

   A. RECORDING
      a. Record the voiceless (1) stop, (2) fricative, and (3) affricate series
         in your native language in an [a__a] frame.
         For instance, if your native language is English, the voiceless
         stop series is [p, t, k], so you should record the tokens [apa]
         [ata] [aka].
      b. Record each of the series 3 times so that you have 3 tokens
         (instances) of each stimulus type.
         E.g., 3 examples of [apa], [ata], and [aka].

   B. MEASURING
      a. Stops
         i. duration of closure
         ii. duration of release
         iii. dominant frequency of release (center of gravity)
      b. Fricatives
         i. duration of frication
         ii. dominant frequency (center of gravity)
         iii. peak amplitude
      c. Affricates
         i. duration of closure
         ii. duration of frication
         iii. dominant frequency of frication

   C. REPORTING
      a. Values
         i. In all cases, you report the average (arithmetic mean) of the
            3 measurements you have made per stimulus type. For
            example, you will have measured the closure duration of
            the voiceless, bilabial stop [p] in 3 different productions
            [apa]_, [apa]_, [apa]_. Find the average of these 3 measures
            and report that the average closure duration for [p] = X.
            (see formatting below for how to report this).
         ii. In all cases, you also report the standard deviation of your
             average value. The standard deviation is a measure of
             dispersion or variation in a distribution. It is the square
             root of the average of the squared deviations from the
             mean. The standard deviation therefore tells us how
             different each of your individual measures are from one
             another. Measures that are similar to one another yield
lower standard deviations than those that are less similar to one another. NOTE: If your standard deviations are high (e.g., approaching your mean), you probably did something wrong. Redo your measures. If you still have a high SD, then re-record your stimuli and redo your measures.

b. Formatting
   i. Organize your number so they make sense to the reader. Classify the segments and measurements in a meaningful way to present the values. One of the most effective ways of doing this is in a table. An example is shown below:
   ii. Example Results Table

<table>
<thead>
<tr>
<th>Stems</th>
<th>Closure Duration AVG(SD)</th>
<th>Release Duration AVG(SD)</th>
<th>Release COG AVerage(SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>p</td>
<td>55(+/-7)</td>
<td>25(+/-3)</td>
<td>1300(+/-120)</td>
</tr>
<tr>
<td>t</td>
<td>50(+/-5)</td>
<td>20(+/-4)</td>
<td>1750(+/-110)</td>
</tr>
<tr>
<td>k</td>
<td>60(+/-9)</td>
<td>35(+/-5)</td>
<td>1500(+/-115)</td>
</tr>
</tbody>
</table>

c. Discussing
   Be sure to include some (brief) discussion of your results. For instance, say what you measured, refer to the table, and describe any patterns that you observe. Do the same thing for each measurement group, and then at the end, consider all the measurements as a whole. For instance, explain what is similar about all of the labial obstruents. Explain how these compare/constrast with the alveolar and velar obstruents. Explain what is similar/different about the stops as a class. Explain how these compare/constrast with obstruents and fricatives. Be relatively brief, since you will also be writing and discussing other measurements.

2. Spectrographic and oscillographic measures of VOT

   A. RECORDING
      a. Record a voiced and voiceless stop series in your native language in an [a__a] frame. E.g., [apa], [aba], [ata], [ada], [aka], [aga].
      b. As before, record each of the series 3 times so that you have 3 tokens of each stimulus type.

   B. MEASURING
      a. Make VOT measures on your tokens using the spectrographic representation of the stimuli.
      b. Make VOT measures on your tokens using the oscillographic representation.

   C. REPORTING
      a. As before, report the averages and standard deviations.
      b. As before, present your data so that it is organized into some logical exposition.
c. Discuss the results and the merits/demerits of the different representations for making these measures.

3. Oscillographic measures of sonorants

A. RECORDING
   a. Record the nasal and liquid series in your native language in an [a__a] frame. E.g., [ama], [ana], [aŋa], [ara], [ala].
   b. As before, record 3 tokens of each type.

B. MEASURING
   a. Using the oscillogram, measure the duration of each of the sonorant segments. Check your work by also measuring nasal and liquid durations from the spectrograms.
   b. Find the midpoint of each of the segments in each of your stimuli, i.e., the midpoint of V1, S, and V2. Report an amplitude measure (rms or some normalized peak amplitude value) for each segment.

C. REPORTING
   a. Present your results as before in an organized fashion.
   b. Discuss the patterns in your data, as before.

4. Vowel formant measures

A. RECORDING
   a. Record the vowels on the outer edges of your vowel space in a [h__d] frame, i.e., leave out the central vowels and vowels of the same height that differ only in rounding. For instance, a typical series for American-English from the West Coast would be: heed, hid, head, had, hod, hood, who’d.
   b. As before, record 3 tokens of each type.

B. MEASURING
   a. Take frequency measures at the midpoints of F1 and F2.
   b. What visible representation of speech must you use to do this?

C. REPORTING
   a. Present your results as before in tabular format. In addition,
   b. Chart your vowels in a F1 by F2 space (see Catford p. 155).
   c. Discuss the patterns in your data, as before.
   d. Discuss the similarities and differences between your formant values and your vowel chart and the idealized values and chart presented in Catford.

5. Transcription

ASSAMESE

Your assignment is to transcribe a spoken passage in Assamese, an Indo-Aryan language spoken in Eastern India. Download the sound file (following the ASSAMESE link) and listen and listen and listen.