

**6.542J, 24.966J, HST.712J LABORATORY ON THE PHYSIOLOGY,
ACOUSTICS, AND PERCEPTION OF SPEECH
Fall 2001**

Lab 7

09/27/01

Sound Segment Reduction

References

Oshika, B.T., V.W. Zue, R.V. Weeks, H. Neu and J. Aurbach (1975) *The Role of Phonological Rules in Speech Understanding Research*, **IEEE Transactions on Acoustics, Speech, and Signal Processing, ASSP-23**, No. 1, 104-112.

Manuel, S.Y., S. Shattuck-Hufnagel, M. Huffman, K.N. Stevens, R. Carlson and S. Hunnicutt (1992) *Studies of Vowel and Consonant Reduction*, **Proc. International Conference on Spoken Language Processing, Vol. 2**, 943-946.

Manuel, S.Y. (1995) *Speakers nasalize /ð/ after /n/, but listeners still hear /ð/*. **J. Phonetics 23**, 453-476.

Procedure

The Speech Group's Vax computer facility will be used to record, display, edit, and playback speech waveforms and to create a tape for an informal perceptual experiment. The spontaneous speech material recorded earlier will be studied in order to determine the intelligibility of brief excerpts of continuous speech in which the sounds have been modified by surrounding context. We will find and excerpt words that have been modified, analyze their acoustic shape and present them for perceptual identification.

During the laboratory period, each group will do the following tasks.

Word Intelligibility Listen to the recorded description and identify 10 or more words that have been modified in context (e.g. alveolar consonants **n t d s** take on place of articulation of following *c*, final nasal *c* is absorbed into preceding vowels, etc.) Determine what portion of the waveform seems to correspond to the word, excise it and save it into a file. Using Maketape, create a listening tape with 3 renditions of each example. Leave about 5 seconds between items, to give listeners time to respond. Make up a response sheet for your tape. Bring the tape and response sheets to class on Tuesday, October 2 for an informal experiment.

Acoustic Analysis Select 3 or 4 examples of modified words, and ask the original speaker to rerecord the utterance(s) speaking very clearly (although still naturally.) Compare the acoustics of the clear and modified versions, and describe the relevant distinctions. If possible, explain the process by which the words or segments are modified.

Computer commands to be demonstrated are listed on the following page.

Summarize the results of the listening test and analysis in a brief lab report that will be due the period **after** the listening session.

RECORD

To record into **VAX**, after login:

1. Type *Record*.
2. Press *Return*. (Leave gain at def = 4.)
3. Press *Return* to begin recording. (You have up to 10 sec.) Press *Space Bar* when utterance is completed.
4. Follow prompt. The max level (right column of numbers) should not reach 0 dB, but should not be less than about 6-8 dB. Otherwise, type *r* and begin again. If OK, hit *Space Bar*.
5. Set cursors with left mouse button:
 - (a) Type *s* for start of segment.
 - (b) Type *e* for end of segment.

Middle mouse button plays from *s* to *e*. You can also type in positions of cursors, and type *p* to play.

6. Type *W* to store waveform between *s* and *e*.
7. Type *?* for more details on features of **RECORD**.

To edit a waveform file (e.g., file.wav)

1. Type *Record file*
2. Edit the file as in 5 and 6 above.

To use Maketape

Type *Maketape* and follow instructions.

