

**6.542J, 24.966J, HST.712J LABORATORY ON THE PHYSIOLOGY,  
ACOUSTICS, AND PERCEPTION OF SPEECH  
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*Lab 14 Supplement*

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**Supplement to Speech Synthesis Using a Formant Synthesizer**

**Suggestions for copy synthesis**

1. Start by setting the duration of the utterance to be synthesized (parameter *du*). For a male voice, use the default sampling rate of 10 kHz. For a female voice, use a sampling rate of 11.5 kHz for both the spoken speech sample and for the synthesizer (parameter *sr*).
2. Pick a point in the middle of a vowel. Make a spectrum of the vowel at this point. Then set the constant synthesizer parameters for F0, formant frequencies, OQ, TL, and formant bandwidths, to give a good match of the synthesized spectrum to the spectrum of the original utterance.
3. Draw the parameters for F0, F1, F2, and F3 as a function of time. Note that when F0 is set to zero, there is no voicing source. Formant parameters must be continuous and should **not** be set to zero or to weird values. Usually F4 and F5 should be set to constant values. After each synthesis iteration, give the *.doc* and *.wav* file a new name.
4. Once the formants and F0 are done, proceed with parameters for frication noise, aspiration noise, and nasalization. You will need to do some matching of spectra between the original utterance and the synthesized one.

**Using the synthesizer**

Log in as *lab*.

Type *xkl* &

Select “synthesize” from the *Synthesize* menu, or type *Y*.

Click on “default” or, if you already have a *.doc* file, find that file.

There is a set of default settings for the synthesizer. To see these, type *p*.

To change a parameter with a constant value (such as DU, SR, ... GV...), type *c*.

To draw a time-varying parameter, type *d*. Enter the parameter to be changed. The time function of the parameter will be displayed. You are asked to enter numbers in pairs: a time value and a parameter value. The graph will show a piecewise linear function. The numbers must be entered sequentially.